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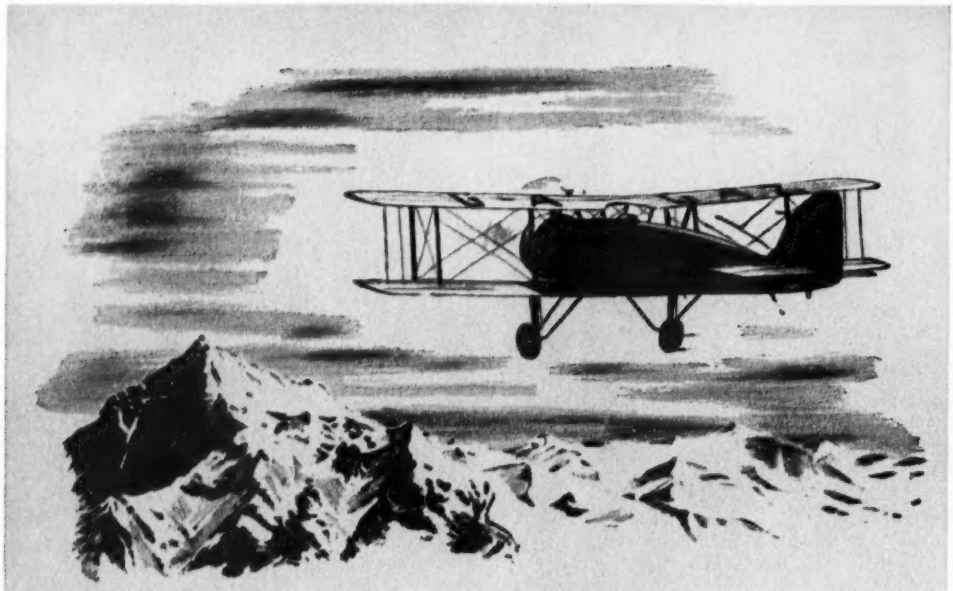

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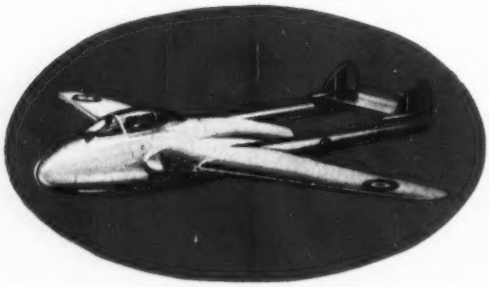

Pilots are now more acquainted with the hazards of flying in rarified atmospheres, and are assisted by even better instruments. Group Captain Cunningham, in setting up the world height record of 59,446 ft. in his De Havilland Vampire, used a special altimeter that registered up to 70,000 ft. again made by Kelvin Hughes.

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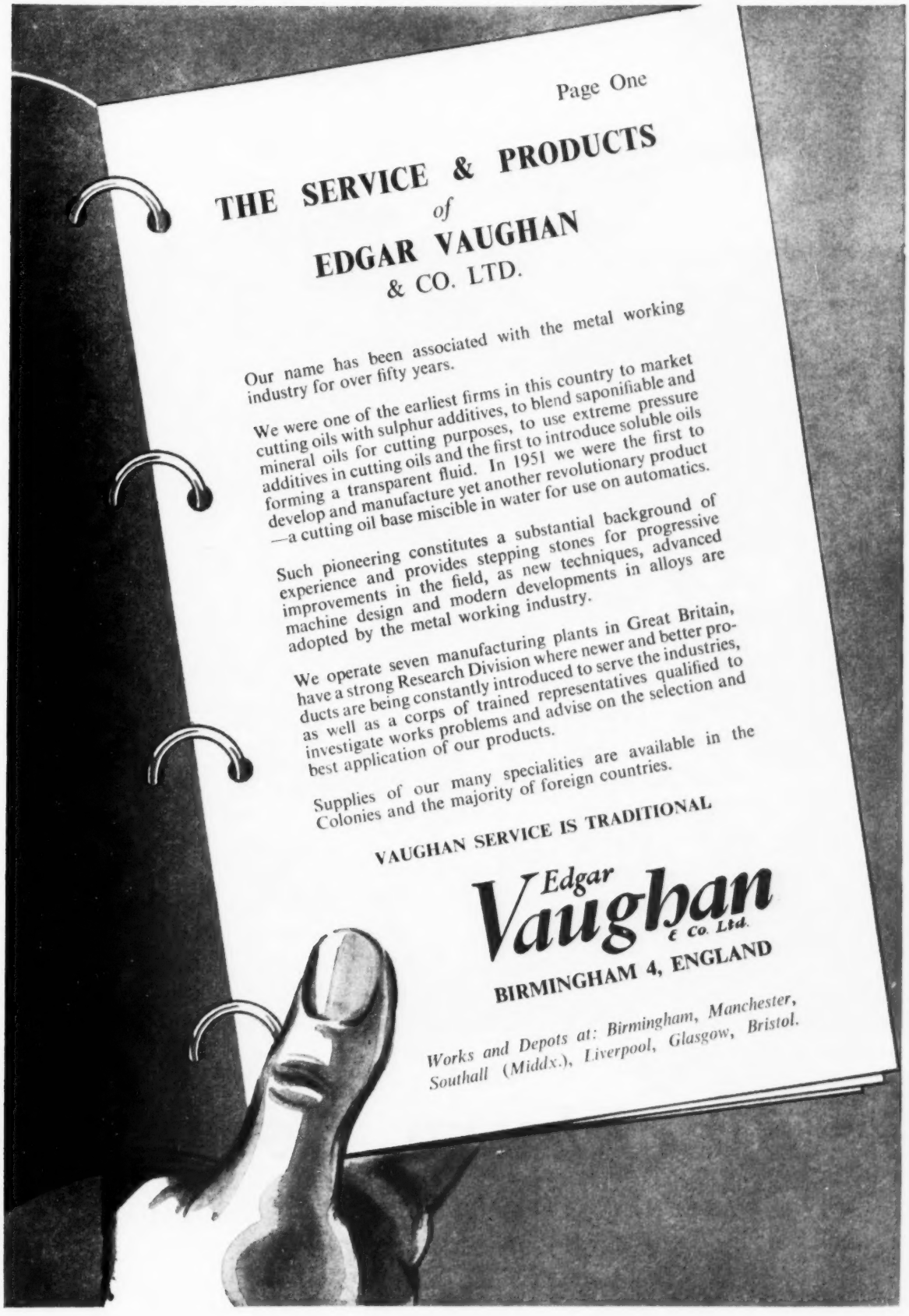
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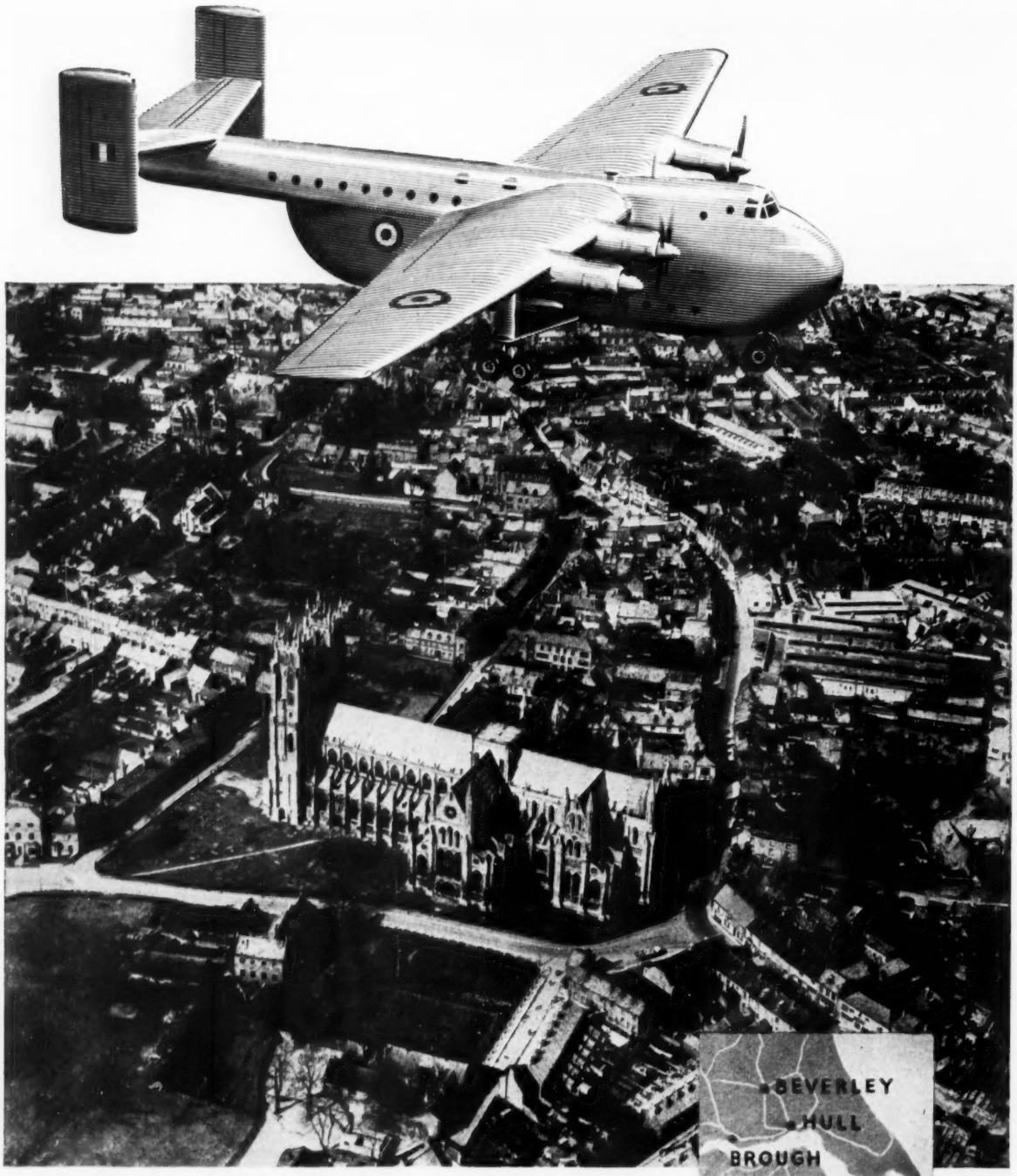

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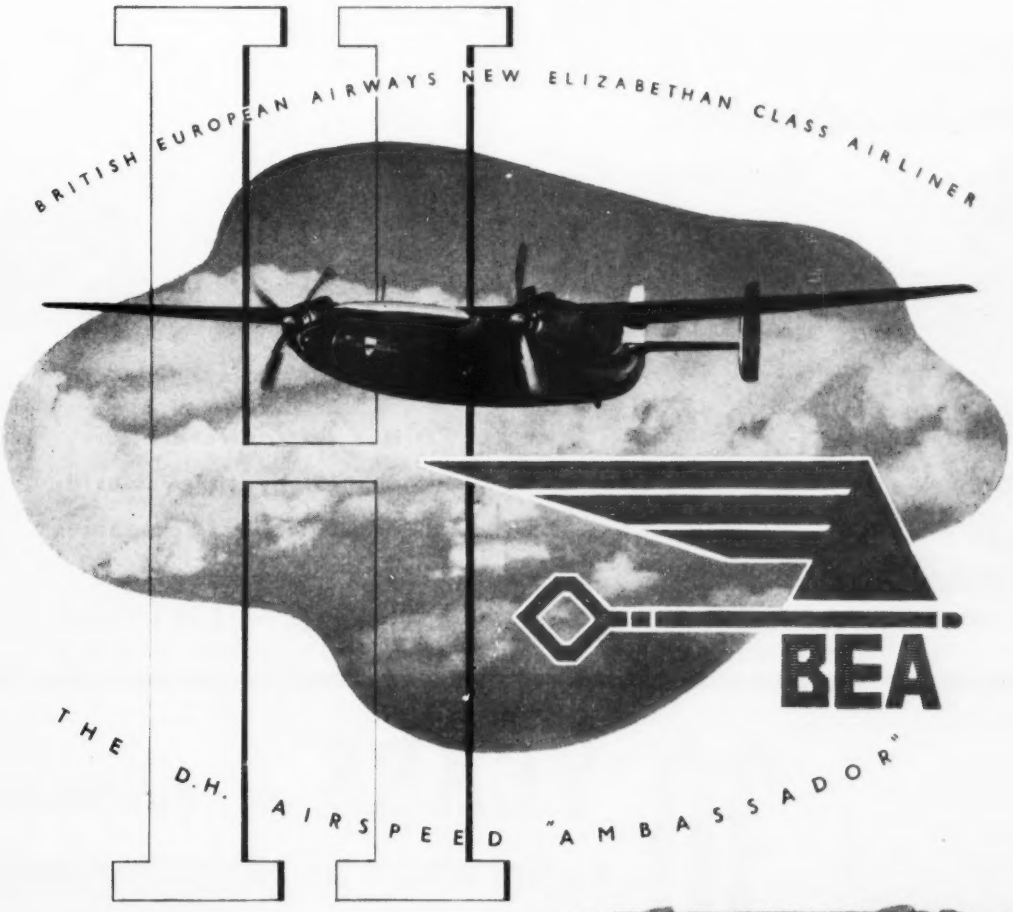

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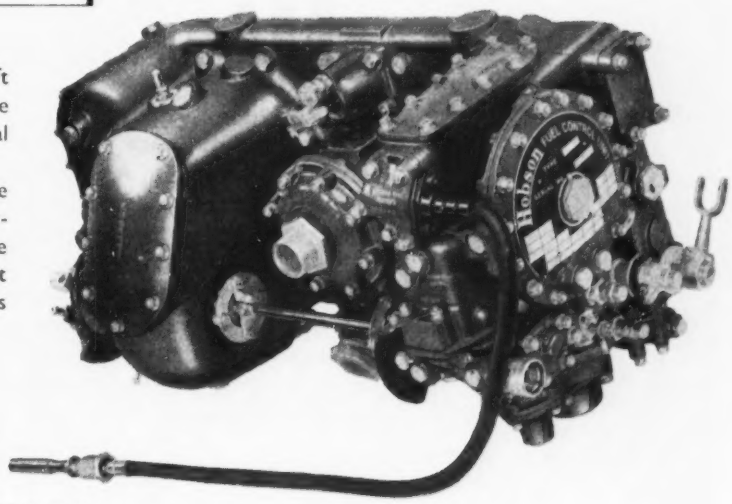

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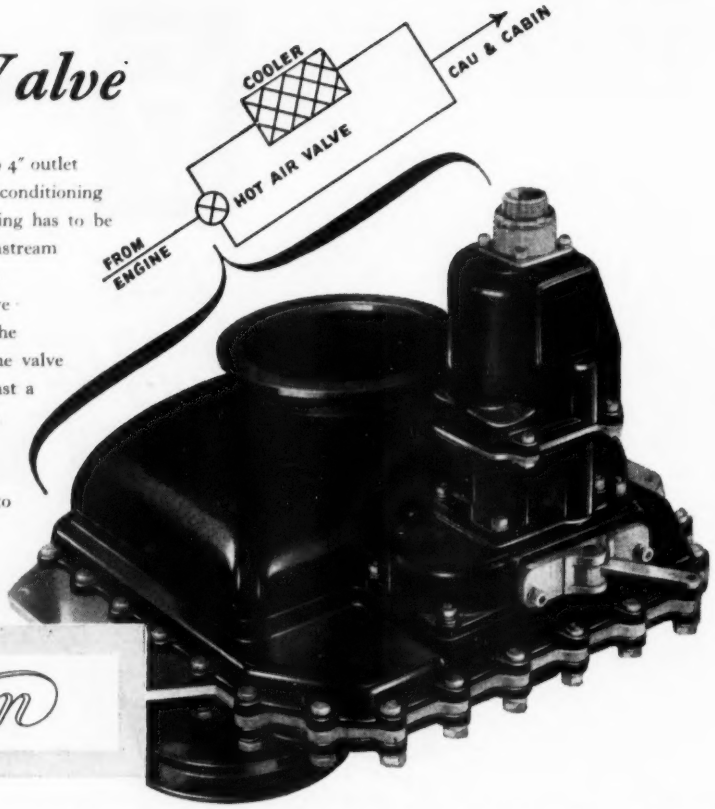

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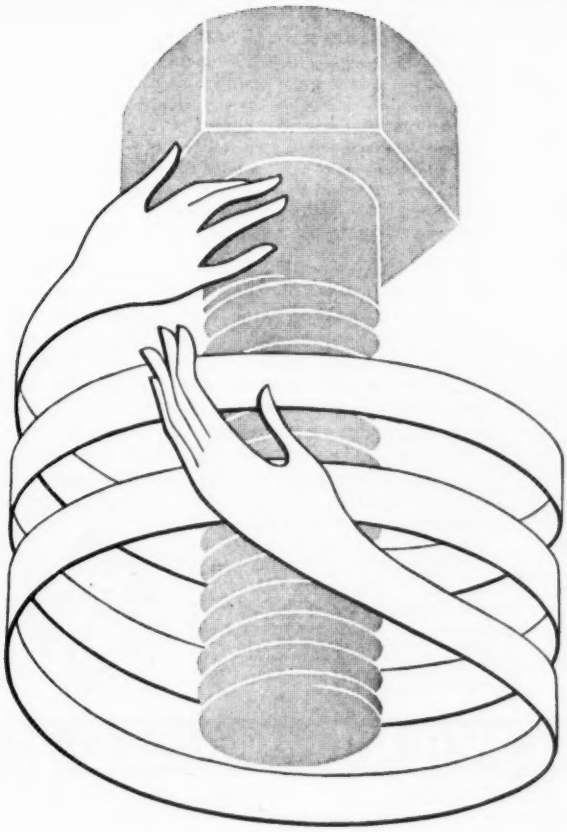

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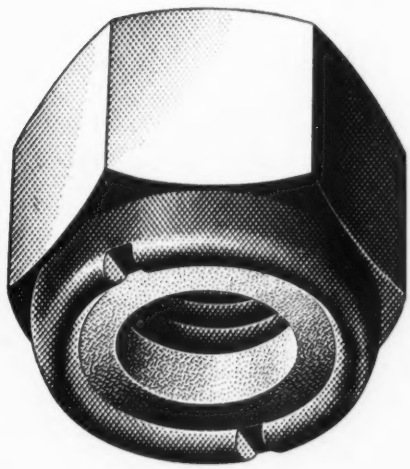

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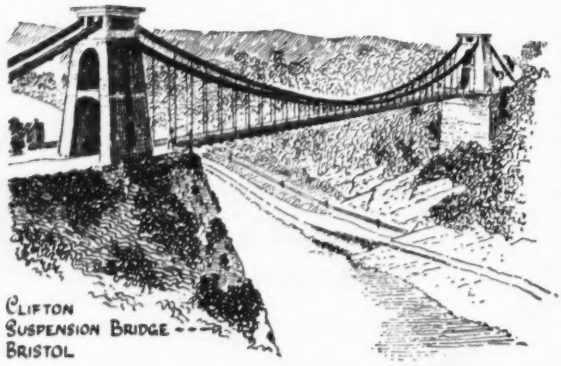

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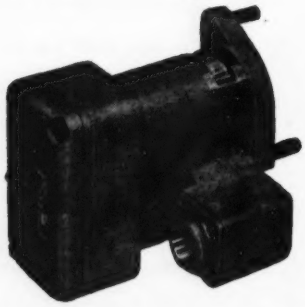

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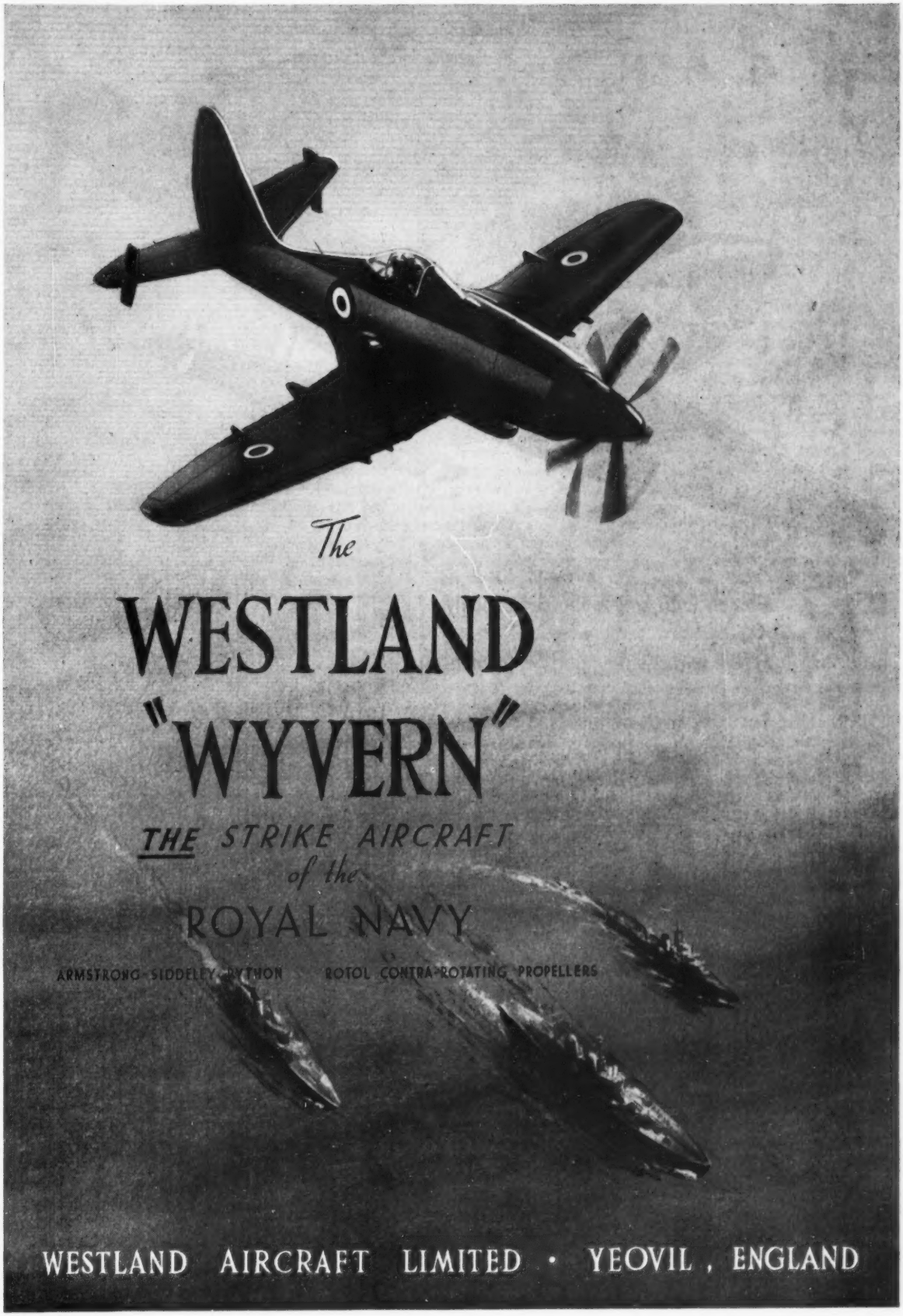
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Founded 1909

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IN THIS ISSUE:

New Vickers Viscounts Named 216
Weapons of Air Defence 219
Record-flight Diary - - 223
Cocooning the Princesses 224
Aid from the Air - - - 226
Sapphire Fuel Pump - - 228
Lightweight versus Heavyweight - - - 230
Discussing Helicopter Maintenance - - - 231
Some Air-transport Thoughts - - - - 232

Reciprocal Understandings

THERE are few countries in the world which have not by now witnessed the passage overhead of a jet aircraft, and ocean crossings by such machines are quite commonplace. The beaming countenance of the pilot of a Canberra which had just crossed non-stop, the whole of the Indian Continent and Ocean, and was still less than a day out from London—it may be seen on page 223—serves to indicate that such a flight is no longer unduly arduous even with the added responsibility of controlling the aircraft.

It is the more surprising, then, that the flight of the Viscount last week-end over the long North Atlantic route from London to Montreal marks the first occasion on which a turbine-powered airliner has crossed to (or from) North America. The reasons why this should be so are certainly more financial than technical, and in this case the flight was a perfectly routine affair preparatory to making cold-weather trials with T.C.A. in Canada. Probably this year will see the first flight across the Atlantic by a pure-jet transport, and if (as we believe) the Comet 2 is that aircraft, it may well be a direct flight. The double crossing in one day by a Canberra earned its crew the coveted award of the Britannia Trophy for 1952, and it has been observed that there is a marked similarity between the performance of the twin-Avon Canberra bomber and the four-Avon Comet 2 of approximately twice its size. B.O.A.C. has already announced its plans to introduce Comets on the North Atlantic service in 1954.

By a coincidence, Mr. R. E. Hardingham, Chief Executive of the Air Registration Board, was travelling back from America at the same time as the Viscount was flying out. His visit has been in connection with the granting of American Certificates of Airworthiness to British turbine transports; details of the results of his talks and cross-examination on British Standards are awaited with interest on both sides of the ocean.

So far as non-American operators are concerned, United States certification is not essential to permit Comets and Viscounts to operate into and out of American cities. Thus T.C.A. have already planned to take their Viscounts into New York and Chicago. This will, of course, permit Americans to see these British machines of which we are so proud, operating side by side with their own more conservative airliners with "up and down" engines. More important, they may feel inclined to try them out, to the immediate benefit of T.C.A. and, we believe, the enhancement of Britain's reputation.

Later on, the Comets too will be operating side by side on some American routes, but before either type of aircraft can be adopted by American companies for domestic services it must be approved by the American Civil Aeronautics Administration. It is the decision regarding the possibility of reciprocal acceptance of C. of A. standards between the United States and ourselves (and perhaps other countries also) that has of late led to so much talk and surmise.

Not unnaturally, America has made it clear that, having no jet transports of her own, she wants to know all about ours and to see examples in action before committing herself on the subject of airworthiness standards. That political or big-business pressure might be brought to bear in the form of attempted delaying action may be quite probable, but we do not agree with some forecasters on both sides of the Atlantic that (a) the American authorities will go out of their way to make difficulties, or (b) that battles will precede each slow step in reaching any agreement there may be. If the C.A.A. call arbitrarily for unreasonable or unnecessary standard design features in jet transports they would find themselves opposing the wishes of their own aircraft manufacturers just as much as ours. A clause concerning C.A.A. certification in the de Havilland/Pan American agreement for the purchase of Comets makes an early solution to outstanding problems desirable, but otherwise there is no great urgency for some months. By then the American authorities will have seen and heard more of our turbine transports.

We have detected a tendency in some places to anticipate trouble between the U.S. and ourselves over more than one aeronautical matter—this certification business, and production and performance of British turbojets in America, are examples. Such innuendo is, perhaps intentionally, Moscow-talk. No two foreign countries have ever stood to gain more by co-operating with each other, nor has there ever been closer liaison and understanding between keen rivals in industry. And that is the way things must stay.

FROM ALL QUARTERS

Nineteen N.Z. Race Entries

BELOW, in condensed form, is the official list of the England-Christchurch (N.Z.) Race entries, made available by the R.Ae.C. as we go to press; there are 13 nominations in the speed section and six in the transport handicap. Names of pilots do not have to be finally specified until June 30th, but a few appear in the list. The race starts from London Airport on October 8th.

Speed Section.—R.A.A.F.: two Canberra B.Mk 2s (2 Avon 1). R.A.F.: three P.R. Canberras (2 Avon) and Valiant B. Mk 1 (4 Avon). Royal Danish Air Force: F-84G Thunderjet (Allison J-35A-29). American Aircraft Corporation (pilot, P. D. Freytag): Spitfire 24 (Griffon 61). C. H. "Slick" Goodlin, U.S.A. (entrant is pilot): Hornet 3 (2 Merlin 130/131). Maj. H. I. Hill and J. L. Dyer, U.S.A. (Maj. Hill is pilot): F-82 Twin Mustang (2 Allison V-1710-143/145). A. J. R. Oates, Australia (entrant is pilot): Mosquito 41 (2 Merlin 69). F/L. J. L. C. Whiteman, Australia (entrant is pilot): Commonwealth Aircraft Corporation Mustang (Packard Merlin). Capt. J. Woods, Australia (entrant is pilot): Mosquito (engines unstated).

Transport Handicap Section.—British European Airways: Viscount 701 (4 Dart 505). Custer Channel Wing Corporation, U.S.A. (pilot, W. J. Davidson): C.C.W.5 Executive (2 Continental SO-470-B). K.L.M. Royal Dutch Airlines: DC-6A (4 Double Wasp CB-17). Mrs. G. T. McKenzie, Australia (pilot, Capt. J. R. Kemp): DC-3 (engines unstated). Royal New Zealand Air Force (captain, W/C. R. F. Watson): Hastings C. Mk 3 (4 Hercules 737). Rausch Aviation, U.S.A. (pilot, Vincent Reavely): Lodestar 18-56 (2 Cyclone 1820-G.205A).

Rhodesian Training to End

THAT R.A.F. aircrew training is to cease in Rhodesia during 1954 was the main point of a statement issued at the weekend by Mr. George Ward, Under-Secretary for Air, in a written reply.

He said that during the recent visit to this country of Sir Godfrey Huggins, Prime Minister of Southern Rhodesia, the Secretaries of State for Air and Commonwealth Relations had discussed with him questions of defence policy in which Southern Rhodesia was particularly concerned. The guiding principle in these discussions had been that the Governments of the U.K. and Southern Rhodesia wished to co-operate in using their resources in the way which was most effective for Commonwealth defence and the interests of the Empire. In particular, plans were discussed for the re-equipment of the Southern Rhodesia Air Force with modern aircraft including jet fighters, which would enable Southern Rhodesia to make a contribution of great strategic value.

As a result of recent changes in the U.K. defence programme, and the measure of re-organization which necessarily followed, there would be sufficient training facilities for all R.A.F. pilots and navigators required in the future, without the R.A.F. having to use the schools of Southern Rhodesia.

The Prime Minister of Southern Rhodesia and the two Ministers of H.M. Government thus regretted that the new circumstances did not warrant the continuation of the Rhodesian Air Training Group on the long-term basis expected, and they had agreed that the training schools should not continue beyond March, 1954, when the existing scheme was due to expire.

Mr. Ward said the U.K. Government wished to place it on record that the scheme had in the past six years made a valuable contribution to the R.A.F. training programme.

Acceptance of Turbine Transports

IN a week or two's time we may hear the best (or worst) about the C.A.A.'s decision on the American certification of British turbine transports. Mr. R. E. Hardingham, secretary and chief executive of the Air Registration Board, has submitted the official report of his visit to the States. As we state in our leading article, American authorities know very much less about these aircraft than this country does. They have no jet transports of their own and seem disposed to plead ignorance and so delay acceptance of our standards, although over the years they have proved to be every bit as good as theirs. It is not that they are purposely difficult, we believe, but rather that they are not over-helpful—and that means, for the time being, doing little to clear the way for certificates for British aircraft. Some progress has been made, and an American test team will be paying a visit later on to fly British turbine transports. In the meantime the A.R.B. is to provide detailed answers to various C.A.A. questions, and will continue to press for acceptance of British certificates.

Aircraft licensing authorities should be careful not to exceed their terms of reference. They have to ensure standards of safety, but they are not themselves aircraft designers. They also carry an international responsibility as do the operators of the aircraft, and so they should be free from outside influence and above restrictive practices dictated by a false sense of patriotism. In this connection the views of the *Canadian Financial Post* are well worth quoting :—

"A recent visitor to Washington was a Britisher whose job it was to convince the United States Civil Aeronautics Administration that the British were not careless, reckless and abandoned in the manner in which they design and manufacture airplanes. Inconveniently for American pride, the British have far outpaced them in the development of jet aircraft. Again, inconveniently, Pan American Airways was on to the latest word in jet transports and ordered a batch of British-built de Havilland Comets. But the deal is up in the air until the United States aviation bureau satisfies itself that the British ship is safe, an operation which a United States publication grandly asserts might take months or years.

"United States plane builders are reported to be lining up behind the C.A.A. faction that wants exhaustive United States tests. We are all for safe airplanes; we ride in them. But the performance and safety record of British aircraft can make it quite clear that U.K. test standards are at least on a par with those of the United States. The Comets put into commercial service in May, 1952, after development work since 1946, are now flying major passenger routes to Johannesburg, Ceylon and Singapore.

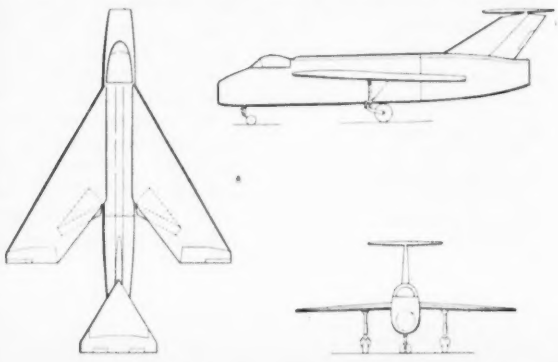
"A country which complains about having to help Allies overseas and which talks so loudly about wanting to embrace a policy of 'trade not aid,' would, we should think, be looking for things it could buy abroad rather than building up contrivances to prevent trade. British aviation authorities accept the say-so of the United States Board in licensing new types of craft. Why should the United States want a one-way street? Is the United States interest in going through the formality solely because of its concern for public safety?"

Adjustable-sweep Progress

THE general behaviour of swept wings can now be fairly confidently predicted. One of the more difficult conditions is met at low speeds, when the airflow has a tendency to break away at the tips, thus causing some loss in lateral control. The effect, which is particularly pronounced when the sweepback angle exceeds about 35 deg, can lead to dangerous flying characteristics at take-off and landing.

The crescent wing—and other configurations—are less prone to such ills; but there is a pressing need for full experimental analysis of the behaviour of sharply swept wings at high angles of attack. To provide such information Short Brothers and Harland, Ltd.,

AS YOU LIKE IT : The general-arrangement drawing below shows the S.B./5 in the "60 deg, high-tail" configuration. In the photograph a number of features can be seen which it has not previously been permissible to reveal. A quite unique feature is the hinging of the underwing flaps about their outer ends, as shown below.



have built the S.B./5 research aircraft, new illustrations of which are now available.

The S.B./5 is a mid-wing aircraft powered by a nose-aspirated Rolls-Royce Derwent. The accompanying views underline the bizarre geometry of the aircraft, for its appearance is necessarily "functional." The undercarriage, for example, is fixed; this has been made possible by the relatively low-speed nature of the aerodynamic investigation programme, and has obviated what would otherwise have been a difficult design problem.

Of thin, high-speed section with a full-span leading-edge flap, the wing is an all-metal, stressed-skin structure between the spars, but the leading and trailing edges are covered with plywood. The stressed-skin tail unit is again unconventional, for the horizontal tailplane is a delta, variable-incidence unit—limits of travel are plus or minus 10 deg—which can be attached either at the extreme top of the fin (as shown) or beneath the rear fuselage.

The wing sweepback angle can be altered on the ground by changing certain components at the root. The precise method adopted cannot yet be described, but it involves little more than a few minutes' work with a spanner. Four different configurations are to be examined : 50 deg sweep, high tail; 60 deg sweep, high tail; 60 deg sweep, low tail; and 69 deg sweep, high tail. Each of these arrangements can be tested within a range of c.g. positions by changing the attitude of the main undercarriage legs.

Little more may be said about the S.B./5 at present, although there is clearly much of interest regarding the control system—particularly the lateral controls. The aircraft has a large fuselage, which no doubt houses all fuel and equipment. An ejector seat is provided, as are anti-spin and three small braking parachutes.

The flying programme, which began last December, is now well advanced. Very satisfactory progress has been made and a considerable number of flights has been completed, on each of which the pilot was Tom Brooke-Smith, the company's chief test pilot. All the flying to date has been done with a sweepback of 50 deg.

Leading data are : span, 35ft 3in (50 deg sweep), 30ft 6in (60 deg) or 26ft (69 deg); length, 47ft 4in; height (as shown in G.A. drawing opposite), 16ft 7in; main-leg track, 14ft 8½in to 10ft 11in.

Remote-reading Radar

IN the past it has often been necessary to site a radar set at an inconvenient point in order to obtain satisfactory performance —or, alternatively, to sacrifice performance in order to locate the set in a reasonable position. This long-standing difficulty has now been met by the new Decca Radar Link, the existence of which has just been revealed. The link comprises a 9 cm, 3,300 mc/s transmitter installed adjacent to the radar scanner, and a remote receiver—which can be located at any desired point within a radius of approximately 20 nautical miles—that feeds the signals into a display tube.

In this way both scanner and display tube can be independently situated more or less as desired. A chain can be established, using link repeaters, if a greater range than 20 n.m. is required, or if hills intervene. The system will also permit the pictures from a chain of stations to be presented in one central control room—or those from, say, one station to be transmitted to various destinations. Definition of the relayed pictures is said to be unimpaired, and photographs appear to substantiate this claim. Production of the new device is now under way.

Proud Record

THE new film *Appointment in London* might well have been called *The Lancaster Story*, for that redoubtable warrior of the night sky is as much a leading character as the wing commander, the Wren, or "the Brat". I have (writes the editor) no hesitation in labelling the film outstanding, and allowing for a possible personal bias (in view of earlier Bomber Command associations) I feel that there is sufficient of a story and a wealth of action and humour—coupled with good casting—to give it wide appeal. Even the more hardened ex-ops types will be moved by the skilfully recaptured atmosphere, and may, like me, appreciate also the tremendous care that has been taken over detail and technical accuracy. It is perhaps strange to feel nostalgia over something essentially hateful, but that is what many who wore Air Force blue, and other uniforms, too, will feel when they see *Appointment in London*. Perhaps it is a longing in divided times to feel oneself once again part of a completely united team with one all-embracing purpose.

Some may feel that the immense forces of wartime Bomber Command seem to have been over-condensed into a single squadron and station (Upwood, in fact) and that more might have been made of the rest of the team. But there should be no difficulty in visualizing the same typical bunch of types getting on with it at a hundred or more other bomber stations.

BY TURBOPROP TO CANADA: The Vickers Viscount 700 prototype G-AMAV left its makers airfield last week-end for cold-weather and other tests in Canada. Here are the crew and technicians : at the foot of the steps, in short jacket, is chief test-pilot G. R. Bryce, with director-designer George Edwards at his left hand; next to Mr. Edwards, to bid the party farewell, is Mr. T. Gammon, deputy general manager of the V-A. aircraft division. As we go to press, news comes that G-AMAV reached Montreal at 0045 hr on Tuesday, after weather delays.

Coming, conventionally, near the end, the climax brings the gripping flying sequences rather late in the film. With the flight commander on the 90th and last flight of his several tours of operations, one is treated to a remarkable few minutes in a Lancaster approaching and bombing its target. Pathfinder marking, master-bomber instructions, air combat, searchlights and flak are all there, as convincingly as one could wish.

It was high time that the bomber boys had their show in celluloid, and no one could say this was an unworthy record. Producers of forthcoming "semi-documentaries" such as *The Dam Busters* and *The Cruel Sea* will be hard put to it to do better.

It should be added that the world première at the Leicester Square Theatre on Thursday, February 12th, was a brilliant affair graced by the Duchess of Gloucester as patron and attended by the Secretary of State for Air and present and past Chiefs of the Air Staff. The film's first-night proceeds have been donated to the R.A.F. Association.

The screen play is by John Wooldridge, D.F.C., D.F.M. and Robert Westerby; production by Aubrey Baring and Maxwell Setton; direction by Philip Leacock; and the principals are Dirk Bogarde, Ian Hunter, Dinah Sheridan, Bill Kerr, Bryan Forbes and William Sylvester. The film is a Mayflower production distributed by British Lion.

Incidentally, in the Souvenir Programme of the première, the last Lancaster raid of the war is said to have been that against Hitler's "eagles nest" at Berchtesgaden on the day of April 25th, 1945, but were not about 100 Lancs dispatched against a U-boat oil storage base at Tonsberg in the Oslo Fjord as that day raid was returning?

VISITING FRENCHMAN : As we reported last week, a Bréguet 96 Vultur carrier strike aircraft is now at Farnborough, where it is to complete catapulting and simulated deck-landing trials. The Vultur approximately corresponds with our Gannet and cruises on a Mamba turboprop; but instead of keeping a second Mamba in reserve, the Vultur has a Nene turbojet in the tail, fed from intakes in the wing roots.

New Vickers Viscounts Named

"Discovery" Christened and the Series 800 Announced

A model of the Viscount 800—the fuselage is to be 13ft 4in longer, and more powerful R.-R. Dart R.Da.5s will be fitted.

IN a few weeks' time B.E.A. is to introduce into regular service the first of its new fleet of Viscount turboprop airliners, known as the Discovery class. An important prelude was the naming of the flagship, *Discovery*, by Lady Douglas, wife of the chairman of B.E.A. The ceremony took place in the presence of a large and distinguished aviation gathering at Vickers-Armstrongs' Wisley airfield on Wednesday, February 11th. The aircraft was flown to London Airport by a Corporation crew after the ceremony, and together with three more already completed, will open services to Nice, Rome, Athens and Istambul on April 19th. Trial services will be flown to Scandinavia beginning on April 1st, and a few weeks later, probably at the beginning of June, the regular Swiss services will begin.

At a luncheon at Wisley to mark the naming of R.M.A. *Discovery*, Lt.-Gen. Sir Ronald Weeks, chairman of Vickers, Ltd., paid a tribute to the Viscount, its designer George Edwards, and to the production team and test pilots. He also spoke of the happy and healthy relationship of his company with B.E.A., with Rolls-Royce, Ltd., who make the Viscount's Dart engines, and with Saunders-Roe, Ltd., who are helping to build main components. Among those he named in welcoming the guests were Mr. Lennox-Boyd, Minister of Transport and Civil Aviation; Mr. Profumo, M.C.A., Parliamentary Secretary; and, of course, Lord and Lady Douglas and Mr Peter Masefield. He also thanked Air Marshal Sir John Boothman, Controller of Supplies (Air), and the Ministry of Supply—"taskmasters responsible for many important developments."

Lord Douglas replied to the toast of "R.M.A. *Discovery*," saying that it was the world's best short-haul airliner and pointing out that it was capable of 300 m.p.h. services at a cost of 0.9 pence per seat-mile. B.E.A. crews, he said, were loud in their praise of the handling qualities, and the engine overhaul life was already 400 hours on introduction.

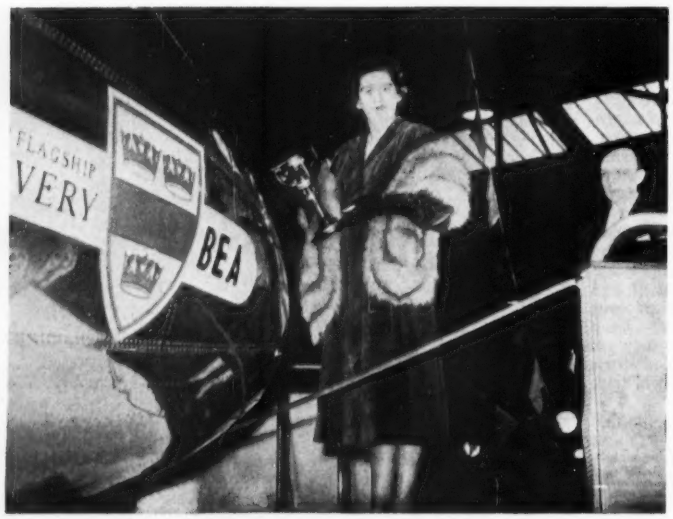
Lord Douglas then made the first official announcement of the new Viscount 800, with longer fuselage and more powerful Darts, which is planned for service in 1955 (reference is made to this aircraft later). B.E.A., said Lord Douglas, had that day ordered twelve 801s to add to their fleet of twenty-six 701s. The first 801 was due for delivery in March, 1955, and all the rest by the autumn.

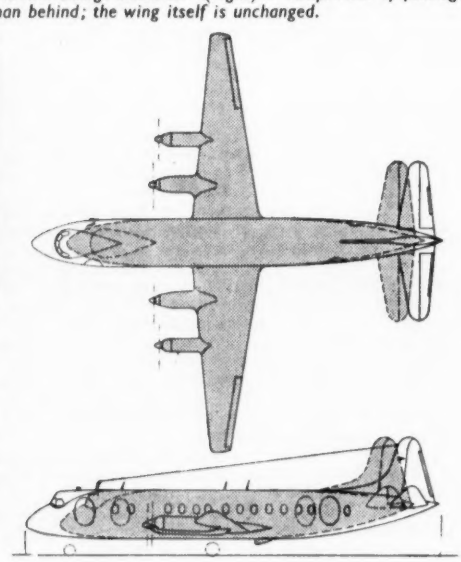
Mr. Peter Masefield, proposing the toast of "Vickers-Armstrongs, Ltd." said that the company had a remarkable team under Mr. George Edwards. He spoke warmly of the six-year association which B.E.A. had enjoyed with Vickers. He looked forward to seeing the Discoveries in service and, ultimately, the newly announced 801. This was just the job for the later 1950s. It was a joint B.E.A.-Vickers project for which a lot was also owed to the Ministry of Supply. He did not agree with those who thought that buying aircraft *via* the Ministry was like making love to an elephant—"difficult to get started, likely to be sat on in a big way, and having to wait five years for results." Mr. Masefield spoke of the petrol tax, which on B.E.A.'s other aircraft was "such a worry on internal routes." He paid a warm personal tribute to the Viscount's designer, whom he had known "from Edwards the Pieceworker to Edwards the Pacemaker." He knew that Vickers had produced many big guns; he believed that George Edwards was the biggest; but he certainly hoped they would not fire him.

The response to this toast was made by Mr. Edwards, who said that personalities played a great part in aviation. He, too, had enjoyed every minute of his work with Mr. Peter Masefield and Bob Morgan of B.E.A., and looked forward to a continuation with the 800. He thought that the greatest thing that civil aviation could do was to make air transport available to the masses, and the 800 was aimed on the right lines towards reduced fares. It was also a significant step for consolidating the strong position of British aviation in the world.

Mr. Edwards was another speaker to couple the Ministry of Supply with B.E.A. and Vickers in giving credits for the production of the Viscount. It was also, he added, the outcome of that British flair for compromise. He concluded by saying that the whole weight of Vickers would be behind Mr. Masefield and the Corporation in making the Viscount work in service; the operators would not be left alone to do it. Perhaps one day there would be a B.E.A. version of the Vickers 1000, and if this was not fast

(Left) Lady Douglas christens the flagship of the B.E.A. fleet "Discovery." Beside her is Mr. George Edwards. (Right) A comparison of fuselage size. Rather more of the increased length is ahead of the wing than behind; the wing itself is unchanged.





The rate of production at the Vickers factory at Weybridge is increasing week by week. This photograph was taken on the day of the naming ceremony. R.M.A. "George Vancouver" is the aircraft in the foreground. "Flight" photographs

enough he thought that Mr. Joe Smith would have something to offer in the 1.5 Mach number class. If this was still not enough, then Mr. Gardener would talk in terms of Mach 2.

Before turning to the new Vickers 800, reference may be made to the departure last week-end of the Viscount 700 prototype G-AMAV for Montreal, Canada. Mr. G. R. Bryce, chief test pilot, was at the controls, and Mr. Edwards was on board. Among the crew were the chief engineering test pilot of T.C.A., Mr. R. J. Baker; Mr. P. J. Stanbury, Vickers' technical liaison engineer; and Mr. J. R. Leach, senior designer. The flight was planned *via* Stornoway, Keflavik, Bluie West and Goose Bay.

Earlier it had been said that this aircraft would be demonstrated in America, but that is not the case. Some sources have tried to make an issue of this supposed change of plans. Vickers tell us that the demonstration flight in America will be made later in the year with a production aircraft. Because the prototype now in Canada carries a good deal of special equipment for cold-weather and other tests (large heaters, Smiths S.E.P. 2 auto pilot, etc.) and has a heavy programme of trials ahead, this occasion is not a good one for demonstration flights. From February 16th to March 30th the aircraft will be at the disposal of T.C.A., who have fifteen on order. At this time Vickers naturally recall the first direct Atlantic crossing of all by their Vimy, and point out that the Viscount will be the first turbine-powered airliner to fly the Atlantic and the first turbine-engined airliner to operate in North America. The first T.C.A. machines are due for delivery in September, 1954.

VISCOUNT 800

Plans to produce this important new aircraft were mentioned briefly last week; fuller data are now tabulated here. Twelve are already on order for B.E.A., who have also taken an option on eight more. The fuselage is 160in longer than that of the 700 Series, permitting four extra rows of seats. The all-up-weight will be 65,000 lb for a start and more powerful Rolls-Royce Dart R.Da5 turboprops will be fitted. Their power output will be some 1,690 e.s.h.p.

This new Viscount is planned to carry a maximum of 82 passengers on short-range services, although B.E.A.'s cabin layout will probably provide for 73 seats. A selling price of £270,000 has been mentioned. Incidentally, the origin of "800" seems to have been a note scribbled by Mr. Peter Masefield to Sir Hew Kilner (unfortunately absent from the naming ceremony owing to ill-health) suggesting an "additional tug" on the Viscount 700.

The power units, Dart R.Da5s, are understood to incorporate a number of refinements and an additional (third) stage in the centrifugal compressor. The engine operating speeds of the R.Da5s may be higher, but with the aid of different reduction gearing the airscrew speed will be no more than at present. As a result, power will be increased, specific consumption will be improved, noise level will be at least as low, and weight will be very little more. The aim will be to achieve an overhaul period of at least 500 hours before the engines go into service.

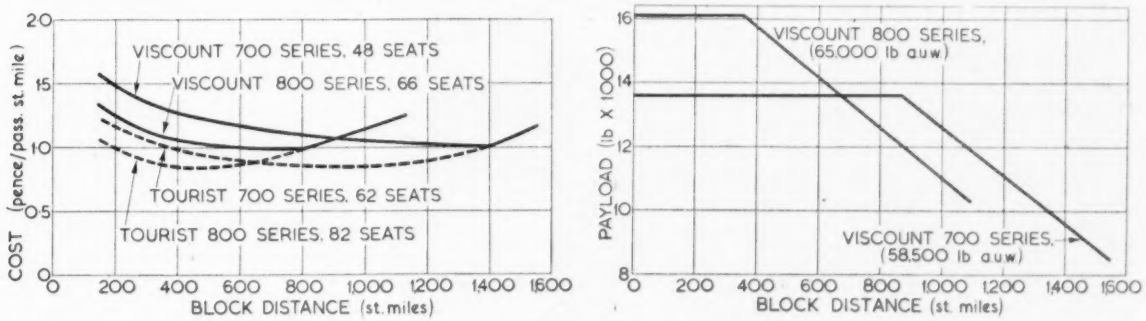
In this connection we may add that B.E.A. have been most agreeably surprised at the overall reliability of their first Viscounts on trial services and for training. One machine did 85 hours without the four Darts being touched, and then, after a brief servicing, had up to last week done another 50 hours.

B.E.A. foresees the use of 801s on eleven European and home routes of greatest density—Belfast, Edinburgh, Glasgow and Paris, Amsterdam, Brussels, Dusseldorf, Zurich, Geneva, Nice, and Milan. On the Scottish routes it will eventually be possible to offer 1 hr 20 min services at a price less than that for the current third-class rail fare.

The announcement of the more powerful Dart suggests the possibility for some medium-long range operators of a 700 Series airframe with the larger engines and increased a.u.w. and perhaps tip tanks to carry the extra fuel. However, perhaps Vickers have enough on their plate at present without more variants.

Comparative data for the Viscount 700 and 800 Series follow. The kerosine tankage remains the same for both versions, namely, 1,729 imp. gallons (2,066 U.S. gall) and for tropical conditions 75 imp. gall of water/methanol are provided for.

VICKERS VISCOUNT	800 Series	700 Series
	4 Dart R.Da5 1,540 b.h.p. + 400 lb. thrust.	4 Dart R.Da3 1,400 b.h.p. + 365 lb. thrust.
Span	93ft 8½in	
Length	94ft 6in	81ft 2in
Height	26ft 9in	
Gross wing area	963 sq ft	
Internal accommodation length	66ft	53ft
Cabin width	9ft 8in	
Cabin height	6ft 5in	
Cabin volume	3,132 cu ft	2,474 cu ft
Undercarriage track	23ft 10in	
Normal gross a.u.w.	65,000 lb	58,500 lb
Wing loading, at a.u.w.	67.5 lb/sq ft	60.75 lb/sq ft
Power loading at a.u.w.	9.6 lb/e.h.p.	9.5 lb/e.h.p.
Max. disposable load at a.u.w.	25,888 lb	25,425 lb
Max. payload	16,820 lb	13,989 lb
Max. landing weight	61,000 lb	52,000 lb
No. of seats (normal)	66	48
No. of seats (max.)	82	62
Performance (I.C.A.N.)		
Max. cont. cruise	312 m.p.h. (20,000ft, 60,000 lb)	320 m.p.h. (22,500ft, 53,000 lb)
Recommended economical cruise speed and consumption	290 m.p.h. (16,000ft, 60,000 lb) 330 imp. gall/hr	300 m.p.h. (20,000ft, 53,000 lb) 282 imp. gall/hr.
Distance to height	130 miles to 16,000ft at 65,000 lb	132 miles to 20,000ft at 58,500 lb
Rate of climb on max. cont. power, S.L.	1,120 ft/min (65,000 lb)	1,275 ft/min (58,500 lb)
3-engine rate of climb, max. cont. power, 5,000ft	400ft/min (65,000 lb)	550ft/min (58,500 lb)
Service ceiling	25,600ft (56,000 lb)	28,700ft (50,000 lb)
Take-off distance, S.L. to 50ft	1,830 yd (65,000 lb)	1,600 yd (58,500)
Landing distance from 50ft	1,120 yd (61,000 lb)	890 yd (52,000 lb)
Stalling speed at max. landing weight	106 m.p.h. (61,000 lb) (flaps 47 deg)	97.5 m.p.h. (52,000 lb) (flaps 47 deg)
Range and Payload (Allowing for 45 min stand-off at 5,000ft and 230 miles diversion.)		
350 miles	16,100 lb	13,600 lb
700 "	13,400 lb	13,600 lb
1,100 "	10,300 lb	11,900 lb
1,550 "	—	8,400 lb


VISCOUNT 700 SERIES, 48 SEATS
VISCOUNT 800 SERIES, 66 SEATS
TOURIST 700 SERIES, 62 SEATS
TOURIST 800 SERIES, 82 SEATS
COST (pence/pass. st. mile)
BLOCK DISTANCE (st. miles)
VISCOUNT 800 SERIES, (65,000 lb a.u.w)
VISCOUNT 700 SERIES, (58,500 lb a.u.w)
PAYLOAD (lb X 1000)
BLOCK DISTANCE (st. miles)

Comparative cost and payload curves for the Viscount 700 and the larger 800 series.

HERE AND THERE

LAST SALUTE : A Sunderland from the Wigtown Bay maintenance base of Short Brothers and Harland, Ltd., takes off to drop wreaths in the area in which the S.S. "Princess Victoria" foundered, with the loss of 128 lives, on January 31st. Sixteen of 24 Short Brothers' employees who were travelling on leave from Wigtown to Belfast were among the victims. Flown by F/L. Ben Ford, the aircraft circled the area while the Rev. A. L. Melrose, an R.A.F. chaplain, held a short service.

H.M.S. "Hermes" Launched

THE aircraft carrier H.M.S. *Hermes*, launched at Vickers-Armstrongs' Barrow-in-Furness yard last Monday by Mrs. Churchill, gives her name to a class of four light fleet carriers which, laid down during the war years, had their construction suspended, then later renewed under the rearmament programme. The *Hermes* was originally designed to carry 45 aircraft, with a complement of about 1,000 men. Her equipment will include a steam catapult and the new "angled" deck.

Flood Visitors

LEAVING London Airport in a Viking of the Queen's Flight, H.R.H. the Duke of Edinburgh made an extensive tour of the flooded Eastern Counties last Friday. He flew first to R.A.F. Station Manby, whence, travelling in a Dukw, and on foot, he visited the Sutton and Mablethorpe areas; he then flew on to Martlesham, where he travelled by car and Naval launch to inspect the River Deben. On the return journey to London Airport the Viking flew low over Canvey Island and other Thames Estuary areas affected. During the week-end the Home Secretary, Sir David Maxwell Fyfe, flew to Holland and inspected the flooded areas from the air, and the Air Minister, Lord De L'Isle and Dudley, paid a visit to Canvey Island and saw R.A.F. personnel helping to rebuild the sea-walls.

Korean Air Activity

AIR activity in Korea flared up again last week-end, when 24 Thunderjets attacked the hydro-electric plant beside the Suiho reservoir on the Yalu River. This was the plant that was heavily bombed last June, and part of it was still under repair. In the new raid, two generators were believed to have been put out of action. The raid was covered by 22 Sabres, which, it is reported, succeeded in holding off more than double the number of Mig-15s that took off from their base only 40 miles distant to intercept the Thunderjets; two Migs down, one probable and four damaged was the score claimed. Other Allied aircraft attacked widely dispersed targets.

Sporting Pioneer

ON February 8th, Lord Brabazon of Tara, holder of R.Ae.C. Aviators Certificate No 1, celebrated his 69th birthday. A few days later, on the famous Cresta bob run, he tied for first place in the Seniors' Cup, and won the handicap event.

The Princesses' Future

NO announcement has been made as to the future of the already completed Saunders-Roe Princess, but it is understood that an extensive test programme is being undertaken. When that is complete, the M.o.S. will have to make a decision as to how and where the big flying-boat shall be employed. One interesting possibility is that a charter firm might be permitted to operate the first craft—and later, perhaps, all three. In this way the Princess could be used for, say, trooping flights without Transport Command having to go to the expense and trouble of training special crews. In any event, serious operations are unlikely until Proteus 3s are available, and the other two Princesses are not expected to be de-Cocooned (see page 224) until similar engines are ready for them. Several Proteus 3s are now running under test, but the Britannias will have priority so long as these engines remain in short supply.

M.o.S Senior Appointment

IT was announced last week-end that A. Cdre. W. A. Opie, C.B.E., has taken up the appointment of Assistant Controller of Supplies (Air) at the Ministry of Supply, with the acting rank of air vice-marshal. He succeeds A.V-M. C. P. Brown, C.B., C.B.E., D.F.C., who has been forced by illness to vacate the post.

French S-55s

A YEAR ago we reported that the French S.N.C.A.S.E. group was to construct S-55 helicopters under licence, and now comes news that—with the approval of the Sikorsky division of United Aircraft Corporation—an agreement has been signed between Westland Aircraft, Ltd., and the French organization for the manufacture of these aircraft.

COTTONING-ON : As related on page 222, a number of Brazilian Air Force pilots who will fly the "cotton barter" Meteor 8s and 7s are now familiarizing themselves with the aircraft at the makers' airfield at Moreton Valence, Glos. Standing in this group, left to right, are Maj. J. E. M. Motta; Peter Lawrence and Geoff Worral, Gloster test pilots; and Maj. J. M. de Assis; kneeling are Capt. W. C. de Miranda and Capt. B. F. Prates.

Physical Society's Exhibition

INSTRUMENTS concerned with research into, and practice of, high-speed flight will be among the exhibits at the 37th annual exhibition of the Physical Society, which will be held at the Imperial College of Science and Technology, South Kensington, from April 13th to 17th.

W. S. Fielding-Johnston

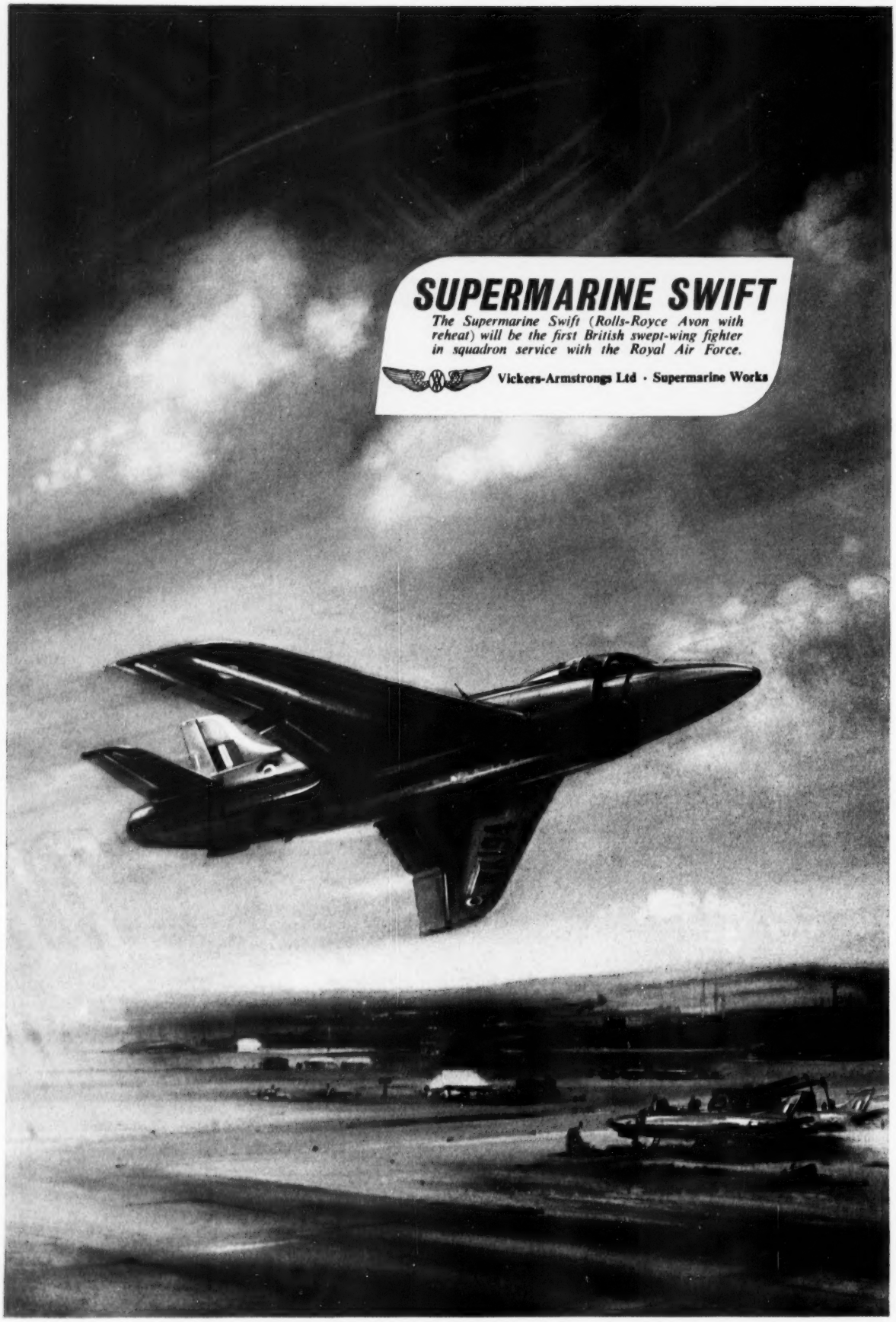
TAKEN ill at a board meeting of his Leicester firm of worsted spinners, Mr. W. S. Fielding-Johnston died on February 10th at the age of 61. He flew in both the World Wars, and in the second he was awarded a D.F.C., at the age of 50, for his part in many Bomber Command raids; two years later he was forced to bale out over Holland when his aircraft was hit by flak. In World War I he flew S.E.5s in No. 56 Squadron, and was credited with five-and-a-half enemy aircraft; in 1918 he was awarded a Bar to his M.C. His son, F/L. Hugh Fielding-Johnston, D.F.C., who also served in the R.A.F., was killed in action.

As the new Armstrong Whitworth N.F.11 comes into service, the night fighter defences of Western Europe get a savage, dependable set of fighting teeth. The R.A.F. hails this deadly acquisition, faster than any known night fighter, for interception or long range pursuit. Ventral and wing-tip tanks give the N.F.11 that precious second wind. Elaborate radar equipment—the N.F.11 is a flying radar station—ensures that contact is made and kept with the elusive quarry until the time comes to open up with the four 20 mm. cannon mounted in the wings.

ARMSTRONG WHITWORTH N.F.11

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LIMITED
BAGINTON, COVENTRY, ENGLAND

MEMBER OF THE HAWKER SIDDELEY GROUP


SUPERMARINE SWIFT
The Supermarine Swift (Rolls-Royce Avon with reheat) will be the first British swept-wing fighter in squadron service with the Royal Air Force.
Vickers-Armstrongs Ltd · Supermarine Works

WEAPONS of AIR DEFENCE

Some Thoughts on Operational and Tactical Requirements

By KENNETH W. GATLAND

THE present revolution in offensive air power, characterized by the greatly improved performance of the bomber and the devastating power of the atomic bomb, has nowhere, least of all in this country, been matched by parallel advances in defence.

Unlike the United States and the Soviet Union, where an enemy must fly vast distances to reach his objective, Britain is denied the opportunity of organizing defence in depth, by reason of the close proximity of her industrial centres to potential enemy bases on the Continent. Assuredly, the modern bomber—which, in terms of the last war, has already cut the time available for interception by more than half—has made these islands a most vulnerable target.

The problem has not arisen overnight. It was apparent as soon as our fighter development programme was laid down in 1946, when one might have assumed that, instead of concentrating exclusively on a linear development of the jet-fighter, attention might also have been given to the rocket-powered intercepter designed expressly for maximum rate-of-climb.

In any defence system where the enemy's striking range is short and atomic attack is an ever-present threat, the climb factor must obviously be regarded as a first essential to ensure that the invader is halted as far as possible from his objective. The requirements of atomic defence are "nothing short of 100 per cent effective," and a pilot will receive little honour for a "kill" made after his adversary has turned for home.

Unfortunately, there is little evidence to suggest that the Air Staff recognized this need; and, excellent though our new jet fighters undoubtedly are in their own right, the guided missile alone appears to fit the character of the problem. The surface-to-air missile is still several years ahead in practical application, however, and there seems to have been no provision for an interim weapon.

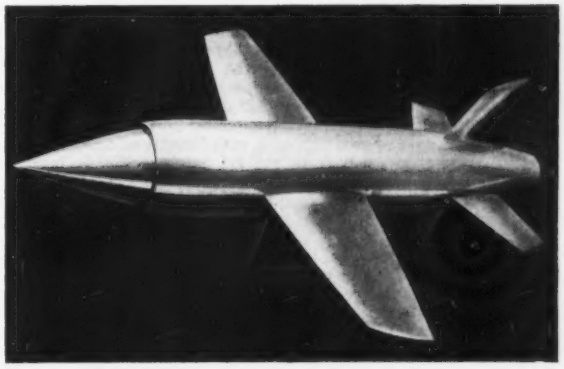
The one project that could have led to improvement, the Miles M.52 transonic research aircraft, was abandoned by the Air Ministry in 1946, almost on the eve of success. Less than a year later, this decision was revealed as all the more calamitous when the Bell X-1 (a remarkably similar aerodynamic conception) made its first flight in the United States.

The reason why the British project was shelved when the detail design was 90 per cent complete, all the assembly jigs finished, component assembly well in hand, and the special Power Jets engine ready to be installed, was difficult to appreciate seven years ago, and today the reason is even more obscure for, despite the official explanation that the move was due to economy, most observers at the time believed that a new project which profited from German experience had displaced the Miles war-time design. Looking back, it is evident now that the substitute project never existed; and, especially in view of America's achievements in supersonic flight with such aircraft as the Bell X-1 and the Douglas Skyrocket, the Ministry's decision, far from effecting economies, has proved most costly.

A little-known fact is that, apart from the two turbojet variants of the M.52, Miles had proposed a rocket-powered version, using a development of a German motor, and it was this project that would have been the most profitable. Not only would the aircraft have provided useful aerodynamic data at a crucial stage in fighter development and permitted its use as a flying test-bed for new rocket motors, but it might readily have initiated a class of rocket intercepter which could well have cleared away much of the official complacency on defence matters that has frustrated a radical approach, within the industry, to the menace of the "atom bomber." The fact that the Folland "light fighter" had to be a private-venture project is an example of the lack of enthusiasm which the industry meets in return for its initiative.

It is sometimes said, in defence of the Ministry of Supply's slowness in taking up the industry's more promising ideas, that development is increasingly expensive and that, in view of Britain's economic difficulties, we could not afford to emulate the United States and "back every horse both ways." Whilst this is obviously true, our development since the war does not appear to have been hampered too greatly by financial considerations. There has, for example, been ample insurance in the bomber programme! Therefore it is not sufficient to say that we lack certain weapons because we cannot afford to develop them; how we *choose* to spend the money we have is also pertinent.

There is no denying that in vital aspects of weapon design it has taken eight years for those responsible for shaping development policy to arrive at conclusions our ex-enemies had reached in 1944, or even earlier. Failure to evaluate the results of German experience in such fields as rocket propulsion, ramp-launched intercepters and rocket armament, and to utilize that experience at a sufficiently early date in building a balanced defence system, has left a gulf between the jet fighter and the guided missile which, at this stage, will be difficult to fill.

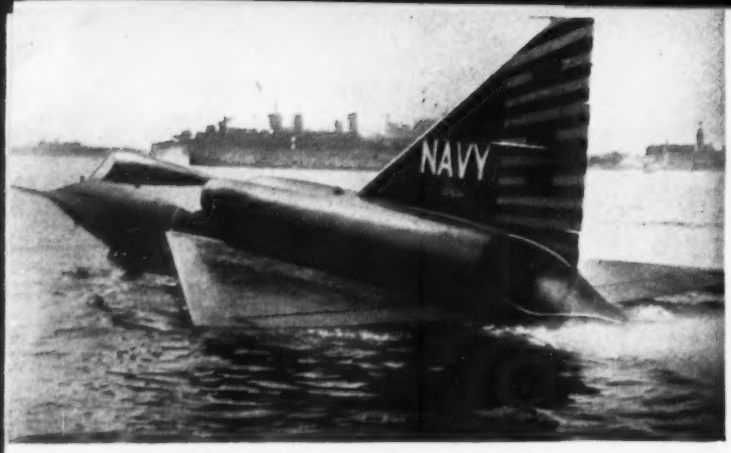


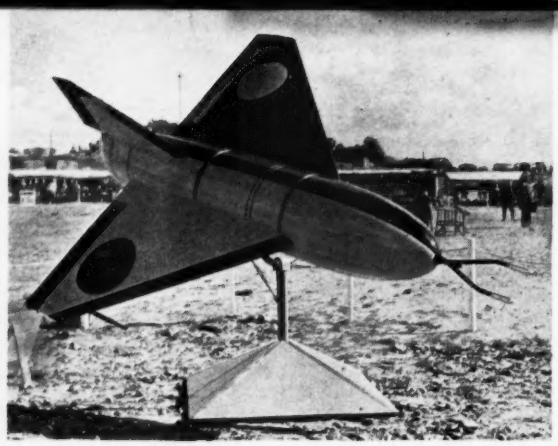
"The Miles M.52 transonic research aircraft was abandoned by the Air Ministry in 1946, almost on the eve of success. Less than a year later . . . the Bell X-1 (a remarkably similar aerodynamic conception) made its first flight in the United States." The upper views show the X-1.

The principal reason why the rocket intercepter has been ignored is undoubtedly because of its high propellent-consumption. Yet correct tactical evaluation would have shown this to be no overriding handicap. With rocket power, it is possible to conceive as a present-day engineering proposition an intercepter having a maximum rate-of-climb of 50,000 ft/min, and a top speed in the neighbourhood of Mach 2; a system of "command guidance" (in which bomber and intercepter would be tracked by radar and the latter guided with precision towards its target) would permit the intercepter to be controlled along the most economical "pursuit curve." It would be launched only when interception was tactically possible.

The great advantage of ramp-launched aircraft is that they could be operated effectively from mobile launchers, requiring neither an airfield nor any fixed base. Consequently, much importance attaches to the unique possibility of shipboard launching, with recovery on a flexible mattress of the type developed at the R.A.E.; in this, the conventional undercarriage is eliminated and the aircraft, following deck procedure, lands on the mattress with the aid of arrester wires and a trailing hook. Apart from permitting landing to take place in a particularly small area, this scheme has the further advantage of making available valuable space in the aircraft (normally occupied by the retracted wheels) for extra fuel or propellent, a factor of prime importance with rocket-power.

Alternatively, one might conceive the intercepter as an aircraft capable of alighting on water, and the Convair "blended-hull/hydro-ski" configuration appears to offer outstanding possibilities for development as a ramp-launched rocket intercepter. This is an aspect the Navy might well consider, since the design (typified by





(Left) "The Convair XF2Y-1 . . . offers versatility of operation which demands little or no compromise in performance." (Right) "At the S.B.A.C. Show last year, the Fairey Company exhibited a 10ft-span model of a delta aircraft designed for basic research in conjunction with the F.D.1."

WEAPONS OF AIR DEFENCE . . .

the Convair XF2Y-1 hydro-ski experimental fighter) offers a remarkable versatility of operation which demands little or no compromise in performance; this is due mainly to the retractable hydro-ski which, in absorbing most of the landing loads, allows the hull (or fuselage) to be lightly stressed and of good aerodynamic form. The fighter is fully buoyant, and as it loses speed it sinks into the water and floats on its fuselage. Altogether, this type seems the more promising as it could be ramp-launched from small ships and in emergency recovered from the sea by fast "seaplane" tenders. Whether in the hands of the R.A.F. or Naval Aviation, the operation of such aircraft would permit a small but significant extension of our defence capacity beyond the coast, and the blended-hull intercepter would be equally capable of using land or sea bases equipped with "mattress"; indeed, such aircraft, when lightened of propellant, might easily be brought down on grass. However, the final verdict must await the results of full-scale trials now proceeding in the U.S.A., for obviously we should want to know how the machine would react on water under unfavourable landing conditions.

In the case of specialized aircraft having high rate-of-climb but a limited duration, launching would be made from an inclined ramp at an optimum angle of 45 deg (this giving the best compromise in range and altitude). The main problem will be to provide stability during the initial moments of the ascent, when the airflow relative to the aircraft is insufficient to react on the control surfaces. The solution is found in a system of thrust-control whereby the exhaust gases are deflected—and the thrust momentarily offset—to oppose any deviation from the flight path. At the S.B.A.C. Show last year, the Fairey Aviation Company exhibited a 10ft span model of a delta aircraft designed for basic research in conjunction with the full-scale Fairey F.D.1 project. The model, which had been on test in Australia, provides a clue to the purpose of the larger aircraft in that power is supplied by the original Beta rocket unit (first seen at the S.B.A.C. Show in 1950), which has two motors mounted one above the other on gimbals; under the control of an autopilot, the upper chamber can be moved to steer the aircraft in pitch whilst the lower chamber moves in yaw.

Whereas the Beta achieves directional stability by the deflection of separate motors, the same result can be achieved with one motor orientating in four directions : the Glenn Martin Viking high-altitude rocket uses this system. There are, however, other possible variations. If, for example, four gyro-controlled vanes (acting in pairs) were mounted at equal intervals round the exit of the venturi so that the exhaust gases impinged on them, they would serve the function of elevators and rudders, reacting on the high-velocity gases instead of on the air. This was, of course, the secret of the remarkably slow yet perfectly controlled ascent of the German A-4 (V-2) long-range rocket.

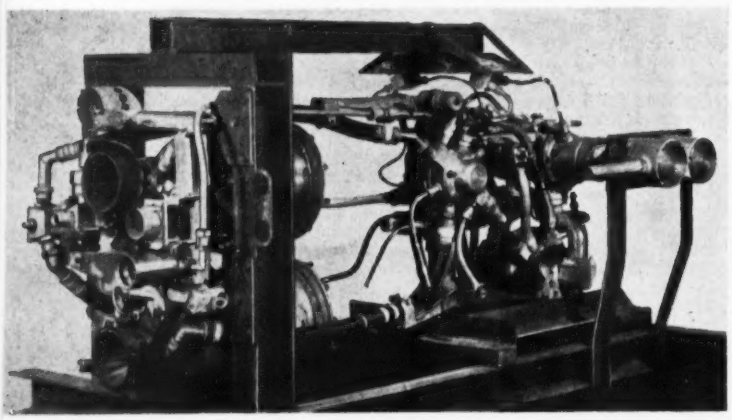
In the case of the A-4, it was essential that the vane device was effective throughout the entire thrust-period—a matter of 60 to 70 secs. The intercepter, on the other hand, will require the device only during the short period following take-off, before the machine has attained flying-speed and is supported in flight by its aerodynamic surfaces : at that stage, the vanes could be retracted clear of the exhaust and the aircraft flown with normal controls. Metal exhaust vanes were, in fact, ground-tested on the German Ba349 Natter; these were hollow, and cooled by a small supply of water which boiled away in about 30 secs, after which the vanes burned up and disappeared. It is of interest to recall that "gyro-controlled steering rudders," as they were then called, were demonstrated as early as 1935 by the late R. H. Goddard during his pioneer rocket experiments at Roswell, New Mexico.

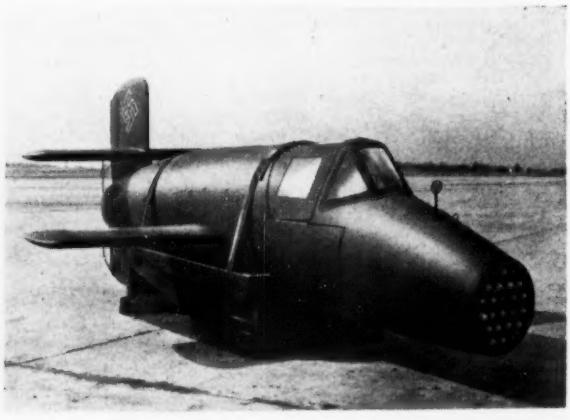
Vertical take-off would be a more gentle experience than is generally supposed, since the ascent could begin under the stabilizing influence of exhaust vanes (or deflecting motors) with an acceleration of 1g effective, the machine only just lifting its own weight (in practice, this would be a good deal more comfortable than the acceleration or deceleration of many a New York "elevator" !). However, it is obvious that unless the thrust is held down as propellant is consumed during the climb, the acceleration may rise too rapidly. In practice, 3g will probably be regarded as the practical limit for a sustained acceleration and, when it is reached, some form of throttle control would be employed; this could best be arranged by closing down propellant-injectors in the rocket motor.

The demands of high-speed manœuvring on closing with the target may dictate a prone piloting position, so that radial pressures are distributed over the entire body, which should raise by a useful margin the pilot's resistance to acceleration loadings.

After the initial attack (made at the top of the climb) and the preparations for a second closing-in, possibly in a shallow dive, propellant could be conserved by periods of gliding, cutting the motor in and out as desired. Some provision must, of course, be made for a small reserve of propellant to ensure the machine's safe return after the mission and, failing the embodiment of a small auxiliary turbojet giving, perhaps, 1,000 lb thrust, the use of a

(Left) The R.A.E. Beta I rocket unit "achieves directional stability by the deflection of separate motors." (Right) "Metal exhaust-vanes were, in fact, ground-tested on the German Ba349 Natter. These were hollow and cooled by a small supply of water which boiled away in about 30 sec."





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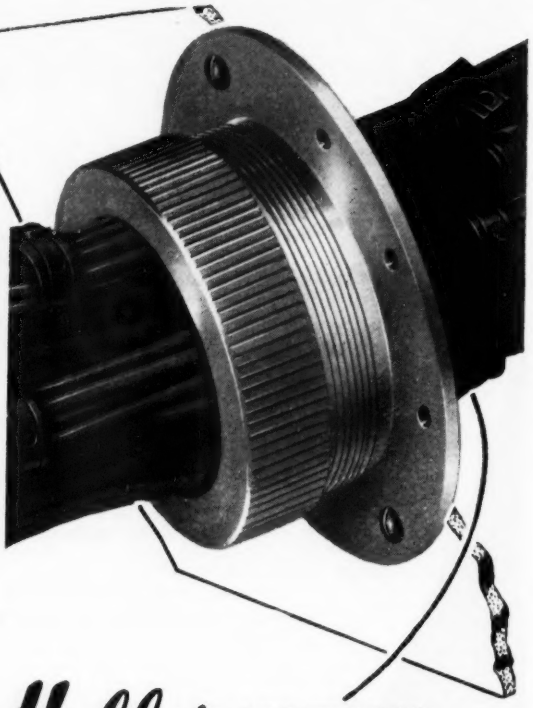

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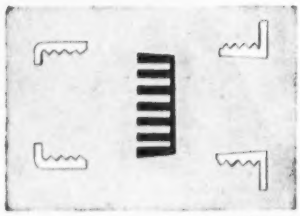

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WEAPONS OF AIR DEFENCE . . .

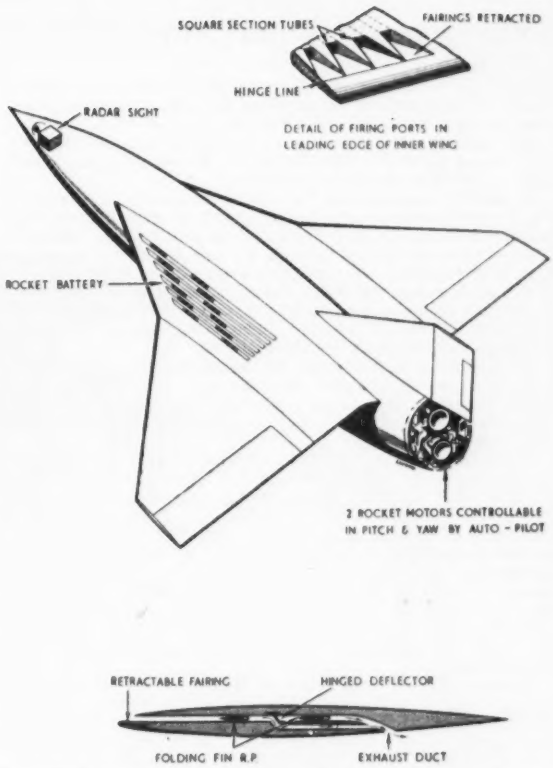
secondary "cruising chamber"—successfully tried on German fighters—appears the most satisfactory solution.

Where does this leave Britain? No one is likely to deny that the guided missile represents a revolutionary step in the techniques of short-range air defence, but it is not the complete answer. A guided missile can be deceived (or at least temporarily deflected) by "window," and its warhead may be prematurely detonated by electronic counter-measures acting on the proximity fuse.

But electronics *monitored by a human pilot* are not so vulnerable. An intercepter carrying a battery of high-velocity rocket projectiles, for example, would be a powerful adversary because it could deliver a large volume of concentrated fire with salvoes of R.P.; the projectiles (being inherently fused) would be immune from enemy counter-measures. Vectored into the vicinity of an enemy force by command posts on the ground, the pilot would select his target and pass over control to automatic tracking radar which, in conjunction with an autopilot, would close the intercepter on its target and aim and discharge its rocket battery at precisely the right moment. The technique has already been demonstrated in certain American aircraft, in which an elevation computor in the nose directs the fighter. The radar sight automatically makes course corrections and continuously ranges the target, whilst the associated device computes the angle of attack by correcting for six or more variable factors influencing correct aim of the R.P. and control of the aircraft; these include consumption of fuel, firing of armament, compensation for c.g. movement when rockets are fired, rocket jump, and dropping of wing fuel-tanks. The sight ensures a perfectly steady "gun-platform" at the instant the rockets are fired. In other words, the intercepter is becoming a guided missile which, instead of being expendable, discharges its "warhead" at the target and returns to base. A stage further is reached in the Hughes XF-98 Falcon—a tiny pilotless intercepter launched from beneath a "mother" aircraft—and the ground-launched Boeing XF-99 Bowmark. Both are designed to "lock-on" to their targets by radar and discharge their armament automatically before returning to the ground under remote control.

It would be defeating one of the main advantages of the pilot-monitored intercepter if its armament were to consist of *guided* missiles which themselves would be liable to enemy interference. Consequently, in conjunction with the development of suitable high-velocity R.P., the improvement of fire-control methods in the intercepter appears to be vital; and, although the radar sight will naturally be subject to the same limitations regarding "window" techniques, useful detection devices can be incorporated in the intercepter by virtue of its greater size—it will, in any event, eliminate the proximity fuse which might be prematurely triggered by the enemy ranging through the radio-frequency spectrum.

The aircraft R.P. offers definite advantages over the aircraft cannon at ranges above 1,000 yards. A solid-propellant rocket with a high specific thrust and good aerodynamic form has a flat trajectory and a considerable degree of accuracy in the line of flight. The complete absence of recoil means that the rocket-launcher can be made exceptionally light; it may consist simply of a battery of open-ended tubes. Most important of all, the rocket permits a large explosive head and an efficient fuse to be



The author's conception of a ramp-launched rocket intercepter, based on the Fairey F.D.1. R.Ps. would be discharged through wing-ports which would open for each salvo. The deflector would be raised to permit firing of the second salvo.

fitted, greatly enhancing the possibility of destroying a target, especially if the projectiles are fired in salvo.

The firm of Oerlikon, Buhrle and Co., of Zurich, Switzerland, is producing aircraft rockets with a particularly high degree of accuracy. There is nothing magical about these weapons beyond careful attention in design and construction to aerodynamic considerations and the use of correct Laval-type nozzles machined to close tolerances. This is a simple yet effective procedure and one which should be carefully noted by those who would dismiss the solid-propellant rocket.

The case for the rocket intercepter remains open. It is no secret that there is vacillation everywhere over the next step in fighter development after the Hunter-Swift-Javelin era. The reason is

(Left) "The aircraft R.P. offers definite advantages over the aircraft cannon at ranges above 1,000 yards"—a Northrop Scorpion F-89D unleashes an R.P. barrage from its wing-tip pods. (Right) Little has been disclosed about British guided-missile progress, but this picture of a two-stage weapon boosted by eight rockets was released last summer. It was taken on the Aberporth range.

WEAPONS OF AIR DEFENCE . . .

obvious: no one is sure how soon the guided missile will arrive, largely to supersede all conventional fighters. A decision must soon be made, however, and it may well be that a break towards a more specialized type of intercepter, lighter and less complex with largely automatic controls, would be a worthwhile investment. A pilotless version might follow.

A possible configuration for such a machine is illustrated in Fig. 8, in which an attempt has been made to solve the following design requirements : (*a*) Provision of two rocket motors acting in pitch and yaw on gimbal mounts; (*b*) fuselage giving maximum propellent capacity; (*c*) armament consisting of 24 folding-fin H.V.A.R. in simple two-stage rocket battery (two salvoes of 12) disposed in region of c.g., easily accessible; (*d*) radar fire-control equipment in nose; (*e*) Overall configuration suitable for ramp-launching and "mattress" or water landing.

An alternative design might be based on a "ducted rocket" power-unit, which combines the advantages of the rocket (high specific thrust at all altitudes) with those of the ramjet (superior range, using one-sixth the propellent, by weight, of the rocket at maximum efficiency).

This is not to suggest that the jet fighter will be eliminated in the next-generation of "bomber-destroyers." Surface-to-air missiles are expensive, probably costing between £15,000 and £20,000 apiece, and to expect to defend a country even the size of Britain entirely with these short-range expendable weapons (with all the ground equipment that this would involve) would be economically unsound, at least in the initial stages. It is fairly evident, therefore, that only certain strategic areas will be defended with missiles; and, although launching bases will be essentially mobile and can be established anywhere at short notice, there might still be sections of the country over which bombers could operate without undue interference.

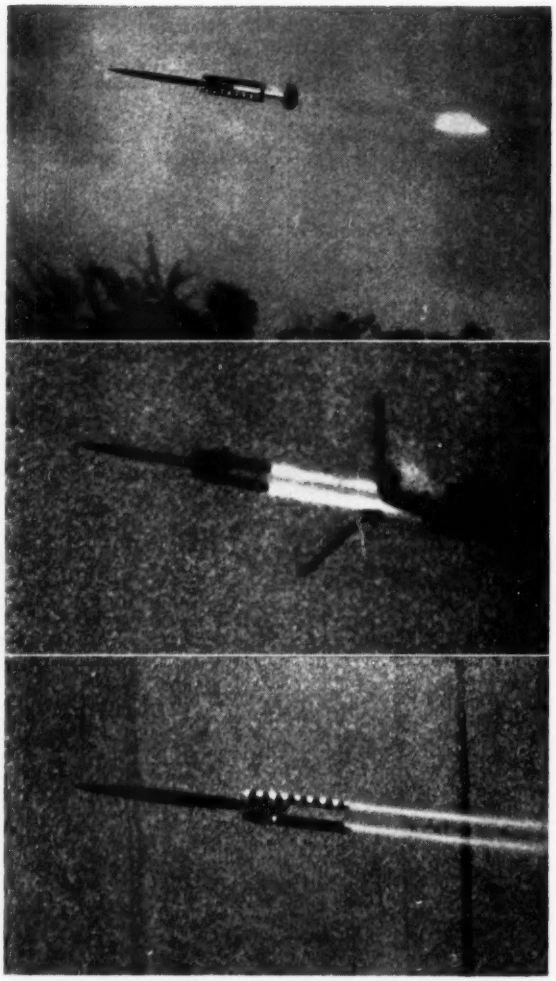
It must be remembered that it will not be sufficient to ring strategic targets with missile batteries; if our defence is to be effective against atomic attack the launchers must be deployed as far as possible from potential targets—i.e., on the coast or even in the English Channel. The same must obviously apply to the rocket intercepter or any short-range weapon.

The jet fighter, on the other hand, by virtue of its superior range and endurance, would almost certainly be required to deliver guided missiles into those sections of sky not effectively covered by ground installations. It will need to be a radical aircraft, however, having a top speed in the region of Mach 2.

Clearly, the guided missile has great promise but, contrary to popular belief, it is not the panacea for all our problems. Theoretically, one missile should be capable of destroying one bomber, but in practice the enemy may saturate the defences with both piloted and pilotless bombers, or skirt the main defence zone, or make his attack with V-2 type rockets that entirely bridge the defences.*

There must come a time when the fast shrinking time-scale of an enemy attack, combined with Britain's geographical weakness (the inability to organize defence in depth) will seriously limit the effectiveness of our shield. The best we may hope to achieve is a unified defence system in which rocket and ramjet missiles (the latter affording greater range) and specialized intercepters each play a part.

* *See "Development of the Guided Missile" by K. W. Gatland, published at 10s 6d, Iliffe and Sons, Ltd.*



Operational sequence of the Bristol ramjet vehicle: (1) tandem booster-rockets accelerate vehicle to supersonic speed. (2) End of boost phase; tandem rockets fall away. (3) Vehicle in final flight under ramjet power. The markings on one of the ramjets are probably to assist photographic recording. This Bristol "test-bed", built to develop ramjets for missiles, was shown at Farnborough last year.

METEORS FOR BRAZILIAN COTTON

DETAILS of the barter agreement between the Gloster Aircraft Company and the Brazilian Government, involving 70 Meteor aircraft and some 15,000 tons of raw cotton, were announced last week in London by Sir Frank Spriggs, K.B.E., managing director of the Hawker Siddeley Group. Sixty Meteor 8 ground attack fighters and ten Meteor 7 two-seat trainers, together with spares, armament and certain maintenance and training services, are being sold to the Brazilian Air Force for £4,241,700. The Brazilian Government is selling this value of raw cotton, of various grades, to the British Raw Cotton Commission, who will establish a credit at a London bank, on which the Gloster company will draw directly. The first four Meteors are due to be despatched this week, and deliveries will continue until approximately the end of October. Shipments of the cotton are expected to be completed by the end of March.

Tentative negotiations for such an agreement were commenced at the S.B.A.C. show at Farnborough last September, and were continued by the Group's representative, Mr. Tim Wills, in Rio de Janeiro in October. After a visit by Brazilian representatives to Glosters at Moreton Valence, the final contract was recently signed by Mr. Wills and the Brazilian Minister for Air, Air Brigadeiro Nero Moura, in Rio.

Describing the agreement, Sir Frank Spriggs stated that 2,000 employees at the Gloster factory would have become redundant had the deal not gone through. Now, however, the existing organization could be maintained and could switch over to Javelin production after completing the Brazilian order. Mr. E. W. Shambrook, secretary and director of Glosters, said that the Meteor contract would not put back the programme for the production of Javelins.

In addition to the machines and the spares, which are being shipped to Brazil by sea, four ground engineers from Glosters will be sent to Brazil for a two-year period of maintenance duties on the Meteors. One of Gloster's test pilots, probably Mike Kilburn, will also go out to Brazil, to assist in the conversion training of Brazilian pilots. A group of these pilots are already receiving training at Moreton Valence.

It is pointed out by the Group that this is the first time in 20 years that the Brazilian Air Force has bought British aircraft. Their last British purchase was of Fairey Gordons in 1932. Although civil aircraft such as Doves, Herons, Bristol Freighters and Comets have been sold to Brazil recently, the Group are proud to have broken the previous U.S. monopoly in the supply of military aircraft to Brazil.

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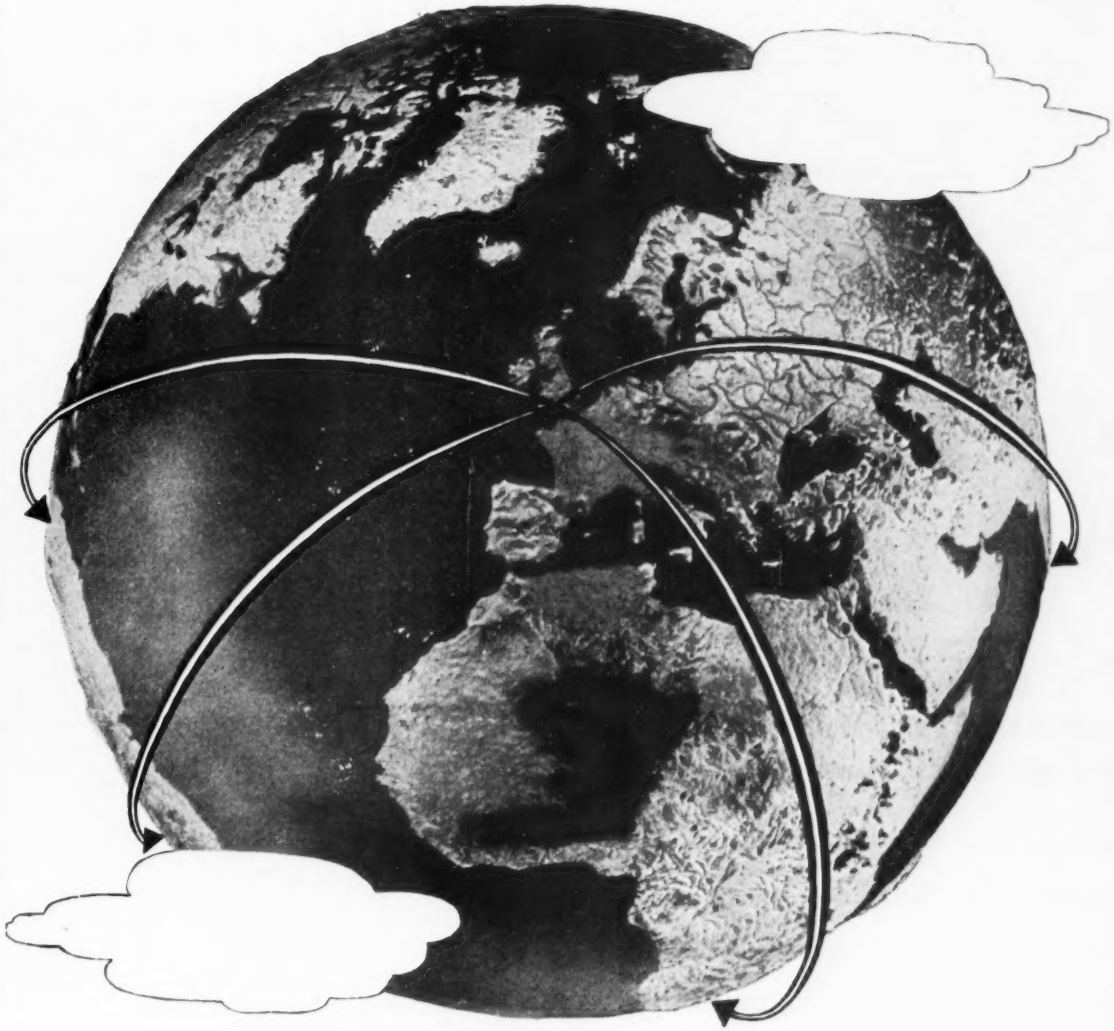

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RECORD-FLIGHT DIARY

F/L. Whittington's Own Story of the Canberra Trip to Australia

NATIONAL anxiety over the disastrous floods has kept most peoples' minds preoccupied—with the result that the remarkable flight from England to Australia by F/Ls. L. M. "Dick" Whittington and J. A. Brown in a Canberra P.R.3 passed from the newspaper headlines and our thoughts, their achievement receiving less recognition than would normally have been the case. We have recently received a most interesting diary-letter of this momentous flight of 22 hours 21.8 seconds, written from Woomera by the pilot, F/L. Whittington. His description is reproduced as received: its telegraphic style is best left unadorned. To avoid confusion, it should be pointed out that both take-off and arrival times are quoted at the beginning of the account of each stage.

AS you may imagine, we have been kept on the trot with the fullest possible hospitality, both at Darwin and here. I will try to give you a *prècis* of our trip, which was really quite fun—and reasonably uneventful, thank goodness.

We had a very well-organized met. briefing, thanks to Mr. Meade and his staff. A good trip forecast for Fayid. Quick word with London Approach Controller, who gave permission to climb on track. Midnight Comet to Singapore cancelled, so no help from them; that was organized with B.O.A.C.—Capt. Majendie and ops. officer, Mr. Noel Davies. Slightly delayed at T.O., but only 5 min late. Official time (Mr. Dismore), T.O. 083544. Landed Fayid 1305 (4.30 hr). Climbed to cruising altitude (42) and pressed on at average G/S of 440 kt (506 m.p.h.). No V.H.F. aid en route—my intercom packed up (suspected microphone); had to get Tony to do R/T, and make frantic signs and write notes—most infuriating. Radio compass O.K., but A.P.I. packed up. Fuel consumption confirmed our previous tests. Cloud 8/8ths underneath until Switzerland—wonderful view of mountains and lakes.

Made good landfall Egypt—and let down fairly rapidly to Fayid circuit. Also, on this leg my flight instruments failed! No intercom, but before I could make Tony understand what was up they came on again! No further trouble afterwards. Crowds of people—the whole station behind ropes to meet us; four bowsers—the full treatment, in fact. Nice meal and briefing nearby. Discovered faulty plug on seat blue lead—no more intercom trouble. Brief for a good tail wind (over 100 kt). G/C. D. Finlay, C.B.E., C.O. of Fayid, kept us up to scratch on schedule with refuelling—seemed to grudge me time to say goodbye!

Take-off 1358—up to 40,000, av. G/S 528 kt (609 m.p.h.) A/B time 3.45. Port flowmeter packed up at 1620. No reliable aids to nav (night effect?). Flew D.R. until beacon was picked up from Karachi. One or two QDMs, and descent—left rather late due to relative uncertainty of distance to go. Timed overhead 1729 hr by A.T.C., S/L. Barwood (friend of mine from Thorney days!) acting for R.Ae.C. Took 13 min getting de-misted prior to landing. The full treatment again—met by S.A.S.O. and the C.O., W/C. J. D. Kirwan, D.F.C. after "stink bomb"* in cockpit. Quick do with health people, wash, etc., wonderful meal again—in a specially prepared room just near the aircraft. Shell refuelling—aircraft still O.K., ready in 18 min. We weren't!

Critical Leg

Rather important met. briefing for very critical leg. Winds forecast nil at first, moderate, then lull, then head winds up to 10-15 from Andaman Is. to Singapore. Realized good chance of having to use Butterworth—but not unduly worried. Prepared to compute fuel on one flowmeter and tank readings, but relying mainly on our graph. A/B at 1845—aircraft fogged with condensation and dripping wet inside. Landed Changi 0125 28th—A/B time 6.40 (!)

We realized this leg was the crux of the thing—if we could make Changi and have a short daylight leg to Darwin we'd be better off than going from Butterworth. The advantage was as much psychological as anything else. We flew strictly for range—determined to get every inch we could from a pint of fuel! Our height after constant—Mach cruise was higher than usual—not far from the aircraft's ceiling. The head winds were not supposed to increase with height. However, temperature became extremely low (forecast was – 70, actual was – 87!) and this reduced our T.A.S. by 15 kt or so. After some discussion—we decided to remain high—the increase in fuel consumpton being greater than the effect of loss of T.A.S. This proved to be a correct decision. We ended up with a fantastic a.m.p.g.—which was just as well.

Log reads:—"Radio compass no good (static) until 2020. V.H.F. useless 2000. Temperature – 67. T.A.S. 414 kt. 2020 radio compass on Magpur—Small natter V.H.F. with them (strength 2, 180 n.m. away). 2038, crossed coast India. Severe upper air turbulence. 2110, Nicobar called on V.H.F.—unable to receive them (½ to 1). 2145, T.A.S. 394. Very severe turbulence. 2200, Butterworth beacon on radio compass. 2240, near ceiling, – 87. T.A.S. 387 kt. Seletar on radio compass. 2320, in cirro-strat, very high. 2340, dawn breaking—called Butterworth V.H.F., told them (after discussion on fuel, etc.) had decided to press on to Changi. V.H.F. and R.C. bearings O.K. 0042, Singapore homer contacted. Gradual descent to try to prevent misting. 0120, Singapore. Straight-in approach to Changi, misting on finals, but got in O.K.

Fuel computed to a nicety—very accurate forecast of what we should have—not a great deal actually, but just safe! A few anxious chaps at Changi!

Arrived at Changi we were met by the C.O.—now A. Cdre. E. C. Bates, C.B.E., A.F.C., and, of course, all the chums—including Doc. Roper. We had the full Press treatment—photos, small talk on wire recorder for broadcast—then off to wash and eat. Again a fine meal (breakfast), eggs and bacon—the lot! In every case we were briefed while eating. We were also greeted by A.V-M. Ackerman, S.O.A., F.E.A.F., on behalf of the C. in C., who was away on conference. By the time we had finished the boys had been ready for some time—they took 13 min to refuel! —No excuses for Boscombe hold-ups now!

They had pushed the aircraft round, so that I took off on reciprocal facing S., straight on to course. T.O. was at 0216 (Z). Landed Darwin 0644—4.30 hr. Stayed low (40) to avoid head winds, which were moderate. Met. was quite accurate; the intertropical front was well north of Darwin—we had got that information at London; we could hardly recognize it—very weak. A few isolated "boilers" had to be avoided, but in general it was a most pleasant flight—we could map-read the whole way.

Av. G/S, 408 kt (470 m.p.h.). Crossed equator at 0250—no ceremony possible! Timed over Darwin 063743. Estimated average speed—using distance *flown* as 8,221 n.m.—(a) Elapsed time 375 kt (430), (b) Flying time 19½ hrs = 417 kt (480). They are our own figures!

We had another "stink bomb" to greet us at Darwin, but we were feeling so relieved, and a little bewildered, that we couldn't have cared less. Quick customs, etc.—full Press treatment again, B.B.C. microphone; nausea! Met by W/C. Cooper, D.F.C. (R.A.A.F.), the C.O. A beer or two and steak meal. Couldn't sleep very well—I suppose we were too tired. They gave us the V.I.P. quarters for that night.

Next morning we were asked to beat up the field at Darwin before leaving; did so, but the cockpit temperature was 140 deg—we were nearly sick! Welcomed here after 2½ hr flight by W/C. Robertson (O.C. flying) and S/L. Tuck—a very hospitable crowd.

Were pleased to receive a signal from Secretary of State for Air and Air Marshal Sir John Boothman. Give my thanks to all concerned including ground crews, who coped very well. Very hot indeed here—but dry, thank goodness.

Crown copyright

F/L. Whittington at Changi, Singapore, with the station commander, A. Cdre. E. C. Bates. From here the Canberra took off on the last leg, to Darwin.

* *Some countries insist upon fumigation of aircraft interior upon arrival.*

COCOONING the PRINCESSES

The Remarkable Feat of Wrapping-up "The World's Largest Package"

ALTHOUGH the post-war "Cocooning" of B-29s in America is perhaps the most well-known example of such protective-storage techniques, aircraft were actually sent to the Middle East as early as 1944 enveloped in a form of strippable plastic envelope. This original type was not entirely satisfactory, especially in removal, but to employ it was a great deal more practical than not to protect the machines at all—or to resort to the use of ordinary grease, which can actually cause damage and is in any case extremely troublesome to remove. The polyvinyl type of plastic Cocoon produced at the end of the war was a great advance, as equipment stored within it could be readied for use a few hours after removal of the Cocoon. R. A. Brand and Co., Ltd., of London, were not slow to realize the significance of the new process, and in 1947 acquired the rights to the U.S. patent. The firm was at that time solely engaged in the paper-making trade, but a special Cocooning division was created, which is now headed by Mr. J. Feasey as manager and Mr. R. R. J. Miller as service manager. "Cocooning," incidentally, is the firm's registered trade-name for the process.

Early in 1952 it was decided by the Ministry of Supply that, in view of the shortage of Proteus 3 power-plants, it would be advisable to Cocoon the second and third Saunders-Roe Princess flying-boats until such time as engines were available. Implementation of this policy was delegated to Dr. Church, of the M.o.S., who drew up the required specification and placed it in the hands of R. A. Brand. Newer processes—which may prove cheaper, and do not adversely affect paint—had already been tried out on a small scale by Brands, and other firms: but there was no paint on the exterior of the Princesses, and it was decided to play safe and use the process that was known to work. Considerable experience of preserving Lincolns by the Cocooning process was already available.

The technical details of the process have already been outlined in *Flight* (August 7th, 1947), but a recapitulation is now due, and, in any event, further details are now available. In the case of the Princesses, the first stage was to seal all openings, notably the engine bays. This was done, under cover, by enclosing each opening with ordinary garden-type netting, over which was sprayed a solution of plastic "webbing compound" to form a basis for the skin. All the rest of the work was performed outside: nothing could be done with wet or frosty surfaces, and the existing scaffolding was required *a priori* last summer for the first boat—so, in spite of the fact that operations started in July, progress was slow, and the first Cocoon has, in fact, only just been completed. Given favourable conditions, three months would probably suffice: a Lincoln takes three to four weeks, a Spitfire-sized aircraft only one.

To return to the actual operations, all under-surfaces of the aircraft were next sprayed in a criss-cross pattern with 6in widths of a sealing compound, the object of which is to make the Cocoon adhere to the metal, which it otherwise would not do. The nose was similarly treated. All sharp projections were covered with plastic sheeting. Then the Cocoon plastic was sprayed on, three coats giving a thickness of 0.040in. A total of nine tons of plastic was used. This was covered by a thin coat of aluminium paint.

The Cocoon itself is highly resistant to the passage of water-vapour, but to ensure that no such transfer takes place, a coating of bitumen was then applied. A band of hessian was affixed along the chine to prevent damage from ropes and the like during launching. More bitumen was sprayed, and, finally, more aluminium paint—to reflect summer heat and thus keep the interior of the aircraft as cool as possible. The complete skin was about 0.11in thick. Its tensile strength was stated to be no less than 17,000 lb/sq in, enough when shrinkage occurs on drying to hold it tightly against the hull. Its elongation is about one-third.

The first Cocooned flying-boat was ready for launching at Cowes on February 11th, and towing—with its beaching chassis still in position—six miles to Calshot: only suitable weather was awaited. The ramp there had been specially strengthened, and the great craft was due to be dragged ashore last week-end, with one float lowered to permit passage between existing sheds. It will remain with one float up and one down during its Cocooned life, for the same reason.

The next stage will be to place desiccant—through holes cut in the existing Cocoon—inside the engine bays, forward luggage holds, floats and tail assembly. Five tons of desiccant will go into the hold to act additionally as ballast, and so balance the aircraft correctly in its engineless state. Most of the drying agent was to have been quicklime—supplied in bags to prevent the alkaline material from corroding the aluminium-alloy structure, and in pellet form because quicklime powder forms a crust and then becomes useless. There were economic and practical difficulties in the provision of nearly seven tons of this material, however, so now the entire dehydration is to be performed with silica gel—in spite of the fact that this material absorbs water so efficiently that it has to be kept sealed until actually in position. Over eight tons will be required. Finally, the holes cut for the entry of the desiccant will be sealed (as also will the wing-tip floats, which have not yet been touched), and the beaching chassis will be Cocooned into the main structure.

Another new problem will be "breathing." In spite of the aluminium coating, the air inside the hermetically-sealed Cocoon will expand considerably on a hot day, and contract again at night. Such continual movement of the plastic skin is bad, and a means must be found of preventing it. Two schemes that are under discussion are (1) to have a large empty bag connected to the hull, into which the expanded air can escape—and (2) to let the air escape into the atmosphere by day, and allow fresh *dried* air to come in again at night. No final decision has yet been made.

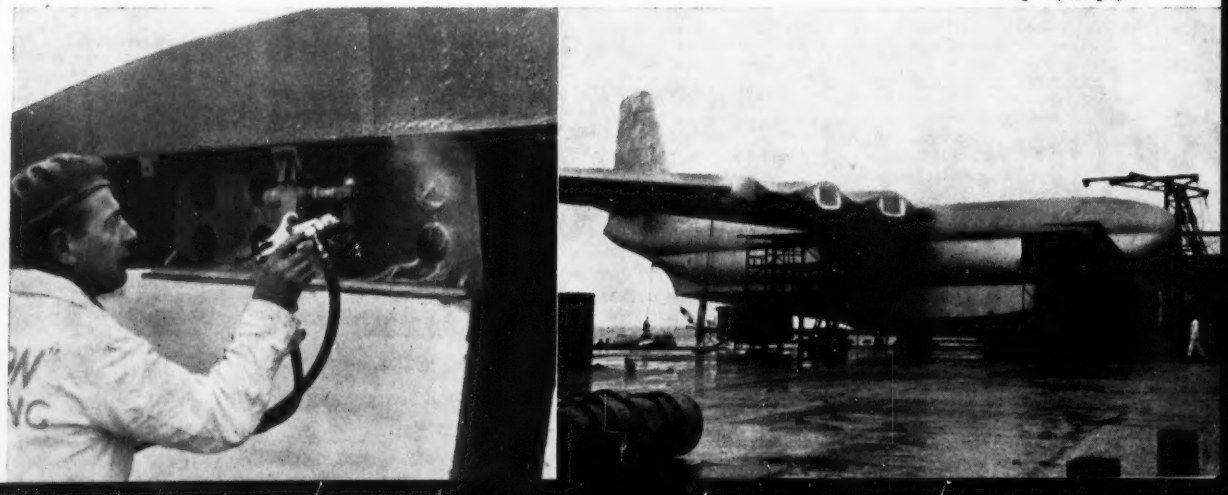
It is claimed that the treatment will preserve the aircraft from water corrosion for ten years, though no one can know for certain. If properly carried out, the system is, undoubtedly, satisfactory for several years at least.

The Cocooned Princess is said—not without reason—to be the "world's largest package." No accidents occurred in wrapping up the first boat, though there were one or two shaky moments—and safety lines had to be used by the men working on the huge 60ft tail fin. Work is now starting on the second craft, the engine bays of which have already been sealed over. With the prospect of better weather, progress in this case should be more rapid.

The question has been asked if the second Brabazon is likely to be Cocooned. The answer is that this aircraft has, for the moment at any rate, an air-conditioned hangar at its disposal—and no Cocooning is likely unless the Brabazon is moved, or time shows that hangar conditions are unsatisfactory.

(Left) An operator sprays webbing compound across an opening, thus demonstrating how a white, gossamer-like layer is formed over which cocoon plastic is then sprayed. (Right) A general view of the first Cocooned Princess, showing the manner in which the engine-bays have been sealed.

"Flight" photographs



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FACTS ABOUT THE GLOSTER JAVELIN / *Super Priority for the R.A.F.*

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Ranking equal with speed as a combat essential, manœuvrability is all-important in to-day's high altitude fighters. Due to its very low wing-loading and Delta planform, the Gloster Javelin displays excellent aerobatic characteristics even at highest altitudes and speeds, whilst at lower altitudes and during landing and take-off it is "as easy to fly as an Anson."

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AIRCRAFT INTELLIGENCE

This is the second prototype Fouga CM-170R Magister. The first prototype of this delightful twin-jet trainer has now completed over 100 hours during its successful test-flying.

Great Britain

Handley Page H.P.R.3. According to *American Aviation*, the Reading division of Handley Page, Ltd., has designed a "DC-3 replacement" known as the R.3. Based upon the Marathon, the design is for a high-wing, pressurized aircraft powered by four Leonides Majors of 870 h.p. each—which would make the machine considerably more powerful than the DC-3. The all-up weight is given as 33,500 lb. Cruising at 220 m.p.h. the maximum payload is given as 10,734 lb, for a range of 380 miles, or 7,050 lb for 1,500 miles. The American journal goes on "with 36 passengers on a 1,500-mile flight, operating cost would be about two cents per seat-mile or 16 cents per ton-mile, company says." The last two words are interesting, for Handley Page are not prepared to comment upon the existence of this project.

Vickers Valiant The second prototype Valiant is now finished entirely in aluminium silver paint which, with the unpainted suppressed aerials detracts somewhat from the bomber's impressive appearance. Another recent external modification is the fitting of cameras above the centre fuselage in a large "acorn" mounted on tall struts. These, no doubt, are for recording the behaviour of wool tufts.

Westland Wyvern S.4. The Wyvern is now cleared for operational service with the Royal Navy; No. 813 squadron will be the first to receive the type. Aerodynamic improvements made during the past few months include the fitting of auxiliary fins to the tailplane, in a manner similar to the Gannet.

U.S.A.

Convair News. Although the big XP5Y-1 turboprop patrol flying boat was not put into production, quite large numbers of its transport successor will be built. This aircraft, the Convair R3Y, will be a general-purpose transport and tanker; for the latter purpose three Flight Refuelling hose and drogue units will be installed, one at each wing-tip and one under the rear hull. The company are now selecting a name for the production aircraft—it is reported that "Gallion" is the most likely choice. Another Convair type recently named is the C-131A casualty-evacuation transport on order by the U.S.A.F. to replace the DC-4. Developed from the Convair 340, the type will be known as the "Samaritan." It is reported that the U.S.A.F. have also ordered four Convair 240s in addition to military developments of the type. Styled VT-29E, two will be "plush, executive transports."

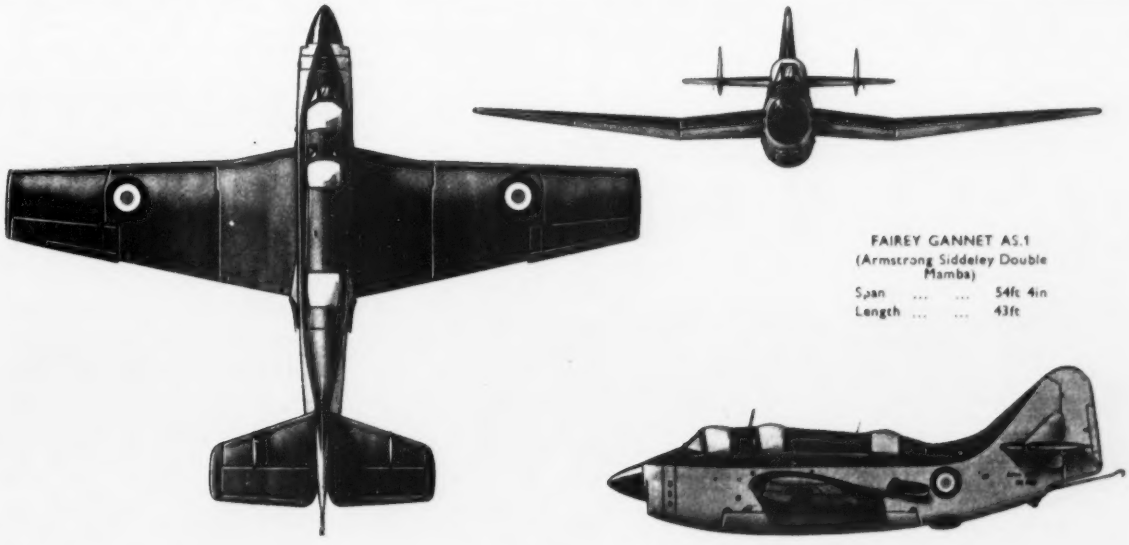
North American Sabre. The first F-86H Sabre is now at Edwards A.F.B. (the former Lake Muroc experimental establishment in California) and is expected to fly this month. The H series, which is already in production at Columbus, Ohio, is powered by the General Electric J-73 turbojet. It is larger than previous Sabres (but smaller than the forthcoming F-100) and can carry a heavy underwing load.

France

S.N.C.A.S.O. Types. During 1952 the South-West division of the nationalized section of the French industry delivered 16 S.O.30 Bretagnes to various companies and, in addition, 16 S.O.94s or 95s to the French Navy. But the major production concerned sub-contracted components for fighters, mainly wings and rear fuselages for the Dassault 450 Ouragan and MD 452 Mystère. The S.O. group also builds the Martin-Baker ejection seat for these aircraft and for the Mistrale (French Nene-Vampire). The most important S.N.C.A.S.O. developments are the S.O.4050 twin-Atar, bicycle-undercarriage, supersonic ground-support aircraft, the prototype of which flew last year; the S.O.9000 supersonic intercepter; and the S.O.1310 convertiplane.

Holland

Fokker Trainers. It is reported that the prototype S-12 (S-11 Instructor, with nose-wheel) is now at the Fairchild factory at Hagerstown, Maryland. Fairchild have shown interest in several Fokker aircraft recently, including the F-27 Friendship transport. The Fokker S-13 twin-engined trainer is unlikely to go into production; the prototype has done good work in rescuing flood victims. The S-14 Mach-Trainer is another aircraft in which the U.S.A.F. is interested; a Dutch correspondent reports that a developed S-14 will shortly make its appearance, with a Rolls-Royce Nene. Half as powerful again as the Derwent-powered prototype, the new trainer is expected to achieve 515 m.p.h.



FAIREY GANNET AS.1
(Armstrong Siddeley Double Mamba)

Span	... ...	54ft 4in
Length	... ...	43ft

With a typical Dutch windmill standing like a lighthouse in a waste of grey water: a Dragonfly of the Royal Navy seeks survivors in the southern part of the island of Schouwen.

The picture at the foot of the page shows a remarkable sight on one of the advanced airfields, at Woensdrecht, in Holland: 14 helicopters, of several different types; they include S-51s and S-55s, a Sycamore, and Bell 47s.

The Great Floods :—

AID FROM THE AIR

THIS week we present a further series of photographs which indicate the magnitude of the flood disaster in England and Holland and also serve to emphasize the vital part which aircraft—helicopters in particular—have played in a hitherto unimagined variety of rescue work.

A Dutch correspondent quotes the following facts and figures concerning the floods in his own country : In all, about 250 aircraft, of which some 38 were helicopters, took part; British helicopters—Naval and B.E.A.—rescued over 350 people; four U.S.A.F. helicopters alone rescued 250, and an S-51 of the Royal Netherlands Navy picked up 45 people on one day and 64 the next; helicopter sorties from Woensdrecht numbered 150 in one day, during which 630 people were rescued; aircraft operating from Valkenburg made 82 supply-dropping flights in a day, loads including 135,700 sandbags; in 348 sorties from Valkenburg in six days nearly half a million sandbags and 50,000 loaves were dropped. Our correspondent adds that Prince Bernhard flew his Stinson Sentinel on several inspection-trips.

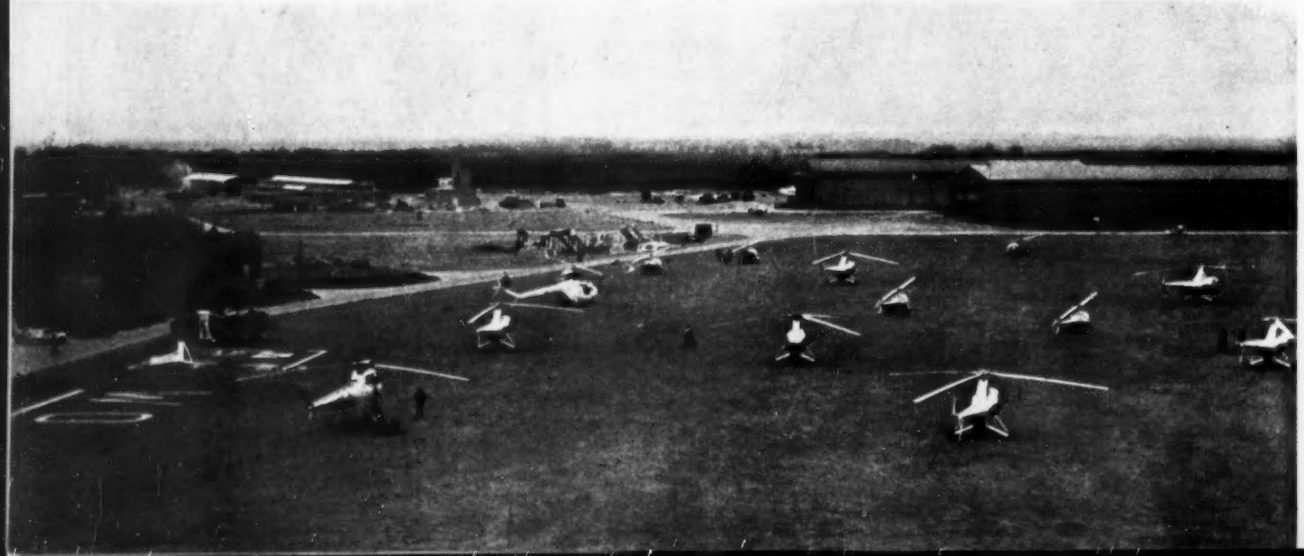
A picture on the opposite page shows one of the two B.E.A. S-51s which went to Holland, and some impressive details of their contribution became available when they returned to their Gatwick base on Tuesday of last week. Flown to Holland by Capt. J. A. Cameron and 1st Off. J. Crewdson, and with W. S. Nelson, a B.E.A. senior engineer, G-AJOV and AJHW arrived on February 5th at Gilze-Rijen, near Breda.

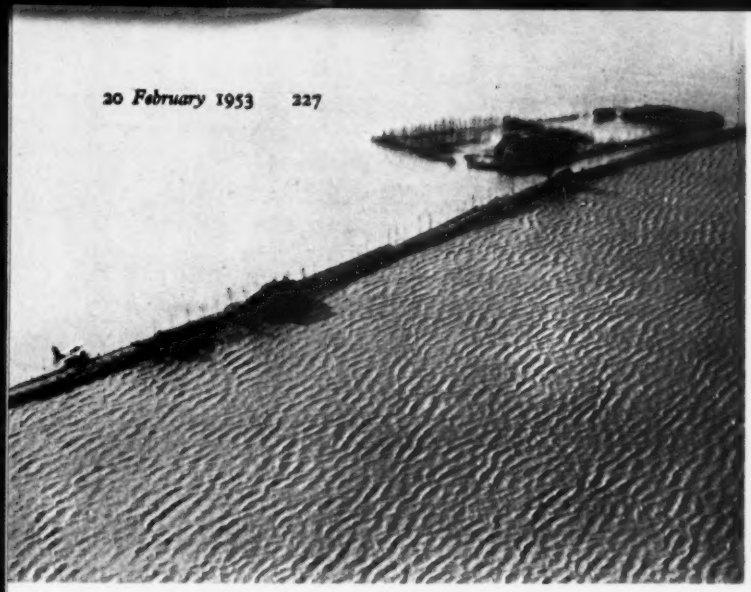
During the next five days the two B.E.A. S-51s flew, between them, 45 hours, of which about 27½ were on direct rescue work whereby 76 people of all ages and both sexes were brought to safety. Also, 44 doctors and nurses were transported, and two tons of medical supplies dropped at some 20 different cut-off villages. Although a rope ladder was carried in each helicopter, it was little used : the pilots found that as a rule the quickest method was to hover within a foot or so of the ground—which was usually mud, or even covered by water—and allow the rescuees to scramble in.

During most of the time weather was bad, with high, cold winds, but visibility was mainly fair. On one occasion, both pilots, flying in company in snow showers at between 500 and 600ft, found ice forming on their windscreens; this did not worry them unduly—until, a few minutes later, they became aware of vibration and found their control-columns making pudding-stirring motions. This was an unmistakable symptom of rotor-blade icing, so they wisely put down without delay.

Cameron and Crewdson described the conditions under which they lived as being rather suggestive of a war of movement in its early stages : on each night sleep was a question of a palliasse on a concrete floor, and food was taken as and when available.

The above incidents are, of course, but one tiny facet of the whole story of the great "flood airlift" in the two countries. Slowly, as the need for their help lessens, the scores of military and civil aircraft, fixed-wing and rotating-wing, have been dispersing during the past week to their countries of origin. It is unlikely, therefore, that the whole story will ever be told : which is indeed a pity, for it would make one of the finest in the whole history of aviation, whether in war or peace.





(Left) A Sea Otter of the Royal Netherlands Navy alongside a dyke on the island of Over-Flakkee; before the disaster the far side of the road was dry land. (Right) An R.A.F. working party restoring one of the breached sea walls of Canvey Island.

(Left) The remarkable efforts of the B.E.A. S-51s in Holland are described on the opposite page: here is Capt. Cameron—with life-jacket—in the cockpit of G-AJHW. (Right) In Norfolk—R.A.F. men at Magdalen, King's Lynn, while a Vampire 5 flies low over the breached bank of the Ouse. (Below, left) A B-25 Mitchell drops sandbags to dyke-repairers at Tholen, one of the worst-hit parts of Holland. (Below, right) This air-to-ground picture, taken on the first day of the Thames Estuary floods, shows an old Lancaster and Vampire 3, on an R.A.F. firing range, torn apart by the water. Note the Goblin turbojet standing near the Vampire.

SAPPHIRE FUEL PUMP

Unusual Features of Dowty Type ENG.129

The pump—dry weight of which is 26 lb—is of clean and functional appearance.

IT is still only rarely that one finds British equipment manufactured under licence in the United States of America, and one can, therefore, assume that the design of such equipment is of the very finest kind. The Dowty fuel pump Type ENG.129—which has been so complimented—richly merits close inspection. Its fundamental concept is not novel; it is a straightforward eccentric rotor, multi-plunger, fixed-displacement unit; yet around this familiar layout have been engineered a number of most unusual and commendable features.

The pump consists of two inter-dependent elements, the pumping unit and a control system. The central part of the pump casing carries a double track ring within which two integral rotors revolve on a fixed eccentric spindle. The rotor has seven cylinders, each containing a plunger-type piston, at the outer end of which is a lead-plated slipper which rides on the hardened surface of the track ring.

This leads to the first unusual design feature: the contact area of each slipper is such as to maintain the slipper bearing pressure at a very moderate level. The pivotal mounting allows each slipper to tilt slightly so that, when the rotor is running, a wedge of fuel rides in under the slipper and lifts it away from the track ring. Each slipper thus behaves as a Michell bearing and so reduces frictional drag to a minimum.

The pump is required to operate at speeds up to 4,000 r.p.m. without lubricant either within the pump or in the fuel. This severe condition has caused great attention to be paid to the reduction of friction, as shown by the previous paragraph. Nevertheless, some slipper drag loading remains, but the effect has been counteracted in what is believed to be a unique manner.

The method adopted to counteract slipper drag loading—applied tangentially to the axis of the rotor at the end of each plunger—can be studied with the aid of the diagram on page 229. The fluid pressure within each cylinder is led through drillings to a point in line with the centre of drag on the side of the plunger in that cylinder, where it exerts a force on the plunger roughly proportional to the slipper drag load. A similar drilling within the plunger applies pressure to the cylinder wall on the opposite side; these parallel and opposing forces provide a couple which counteracts the drag of the slippers almost exactly, irrespective of the cylinder pressure. Accurate alignment of each plunger is ensured by the spherical seating of its pin joint as shown in the second small diagram on the opposite page.

The spindle on which the rotors revolve has two axial drillings connecting the inlet and delivery chambers with the appropriate valve ports on the spindle surface. The inlet ports register with each of the cylinders in turn as the plungers in those cylinders move outwards to draw in fuel. As each plunger reaches the top of its stroke, the cylinder moves across a land whose width slightly exceeds the cylinder bore. As the plunger descends, the contained fuel is discharged under pressure through the outlet valve port and spindle gallery to the delivery chamber. Another unusual feature clearly shown in the section drawing below is the staggering of the double-banked cylinders to ensure a smooth delivery of the fuel.

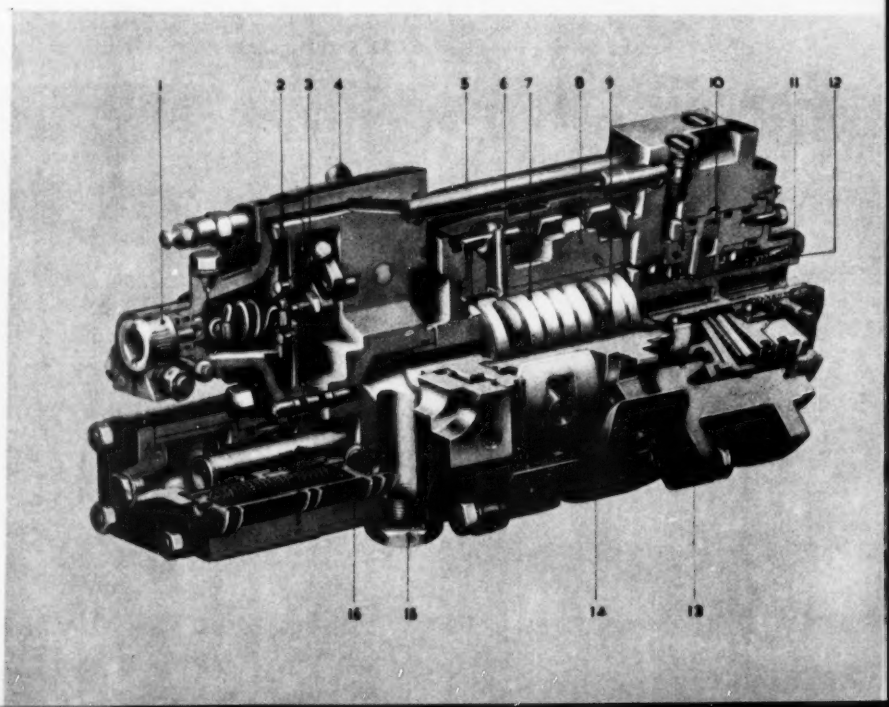
Both rotors are connected to the main drive-shaft through an Oldham coupling which compensates for any eccentricity likely to be present as a result of machining tolerances. The drive shaft itself has internal splines which mate with a quill on the drive from the engine.

Initially, some difficulty was experienced in finding the correct plating medium for the rotor bush. In earlier fuel pumps, lead plating has been quite satisfactory. Unfortunately, this type of bearing cannot stand up to the corrosive attack of certain ingredients of the wide-cut fuels now being used, and considerable experimental effort was required to find a solution. The remedy has been the adoption of tin plating and no further trouble has been experienced in this regard.

The soft metal surface is intended to embed any minute hard particles which the incoming fuel might contain. Bearing seizure is virtually made impossible since the base metals are separated by the tin, which would flow freely before the heat of seizure could disturb any other surfaces. Excessive trapped matter could, of course, destroy the plating and reduce efficiency, but the manufacturers state that the pump would still continue to function effectively for an indefinite period.

The integral control system maintains engine speed within the prescribed limits. A servo control by-pass valve is incorporated between the pump inlet and delivery connections. The servo responds to the pressure generated by a small centrifugal impeller mounted on the drive-shaft. From the inlet gallery, fuel enters the impeller chamber from which the centrifugal pressure is transmitted back to a conical housing at the rear of the pump. Here, it acts on a flat diaphragm which is sustained by an adjustable coil spring and balanced on the inner side by inlet fuel pressure.

At the maximum permissible engine speed, the pressure gen-



This sectional view shows well the main features of the Dowty ENG.129 high-pressure fuel pump: (1) Overspeed governor adjustment screw; (2) diaphragm; (3) servo valve rocker-arm; (4) restrictor; (5) centrifuge tube; (6) plunger; (7) distribution valve; (8) rotor; (9) high-pressure delivery orifice; (10) impeller; (11) carbon seal; (12) internal quill serrations; (13) track ring; (14) slipper; (15) trip valve; (16) by-pass.

The Percival P.56 "Provost" trainer with the Alvis Leonides Engine

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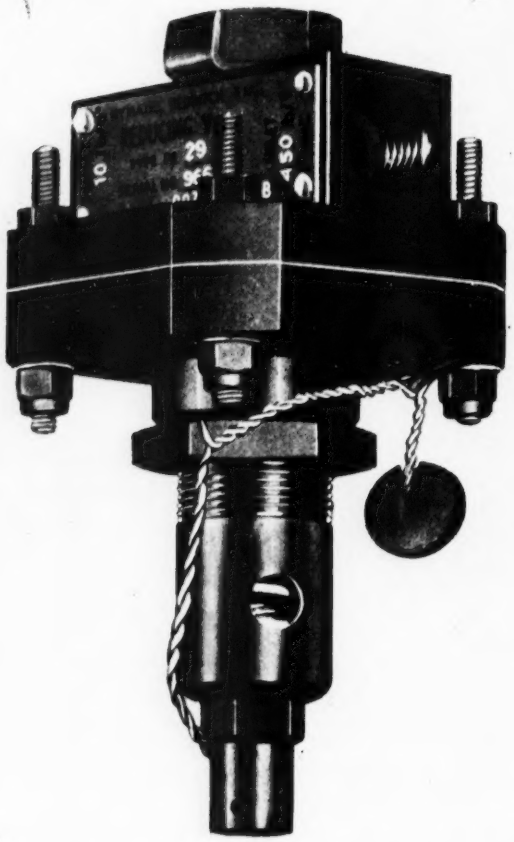

It weighs less than 6 oz., is extremely compact, and can deal with air pressures from 450 p.s.i. to 2½ p.s.i for tank pressurization, cabin sealing, fuel transfer, auto-pilot actuation, and other uses.

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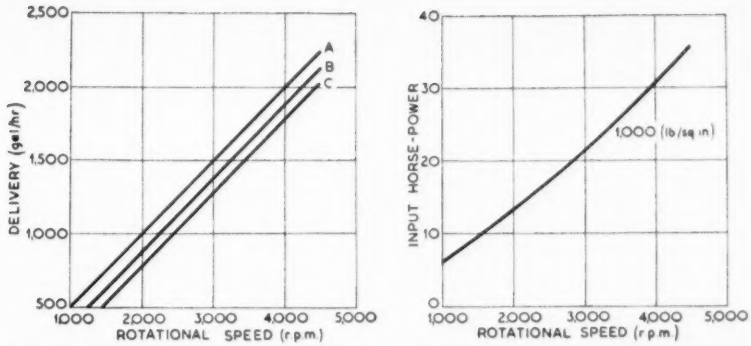
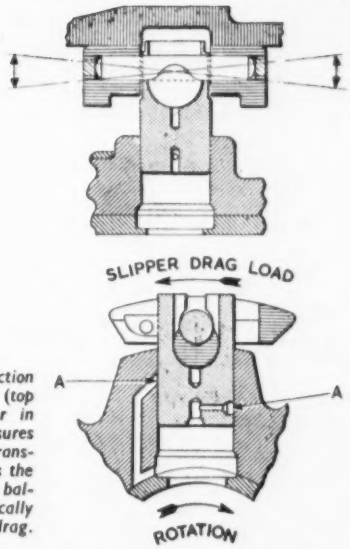


Principal performance data for the Dowty pump. The curves of delivery plotted against r.p.m. (left) refer to free-flow delivery (A), delivery of kerosine at 1,000 lb/sq in (B) and delivery of an aviation gasoline at the same pressure (C). The curve of power against speed (right) is for aviation gasoline at 1,000 lb/sq in. Both the graphs here refer to a fuel inlet pressure of 10 to 20 lb/sq in, at a temperature of 20 deg C.



The longitudinal cross-section through one cylinder (top right) shows the manner in which the ball-joint ensures plunger alignment. The transverse section (right) shows the pressure areas (A) which balance the plunger hydraulically and so counteract slipper drag.

SAPPHIRE FUEL PUMP . . .

erated by the centrifugal impeller is sufficient to move the diaphragm against a tappet mounted at one end of a rocker arm. Movement of the rocker arm permits a half-ball valve to lift, so opening an orifice which leads to the head side of the servo piston.

In the equilibrium condition, both sides of the servo piston are exposed to the pump delivery pressure, but the difference in area between the face of the piston and the piston valve side ensures that the servo piston is held in the closed-port position. When the half-ball valve is opened, the pressure acting on the head of the piston is relieved; as a consequence, the servo piston moves unopposed along the cylinder. The piston valve has a profiled slot which increases in area as the cylinder ports are uncovered. Through these ports fuel flows in a closely controlled manner from the pump delivery chamber to the inlet chamber, the overall effect being to by-pass the excess fuel delivered and supply the burners with no more than the exact fuel flow required by the engine at its maximum throttle setting.

As the fuel flow delivered to the burners is reduced, the engine speed also falls. This in turn reduces the pressure generated by the small centrifugal pump, so permitting the diaphragm to move away from the rocker arm under the influence of its supporting coil spring. This has the effect of re-seating the half-ball valve and so raising the pressure acting on the head of the servo piston. As a consequence, the servo piston returns to the closed-port position and normal pumping conditions are thereby restored.

The pump by-pass valve may be linked hydraulically with control units in any fuel system. It automatically responds to signals for increase or decrease of fuel flow caused by variations in altitude. Further, it preserves the correct fuel mixture in the combustion chambers by transmitting signals received from control units sensitive to variations in the air mass-flow through the casing of the main engine compressor.

Altogether, the Dowty ENG.129 pump is a notable example of British ingenuity and fine engineering. An external view of the unit is shown on page 228, in which the standard mounting flange with eight holes is seen at the drive end of the pump for attachment to the engine gearbox. The performance curves on this page were obtained with typical grades of aviation kerosine; with 87 octane petrol the delivery is about 10 per cent less, due to the lower viscosity.

It will be recalled that the Sapphire is one of the British gas turbine engines which have been officially pronounced capable of operation on various fuels, including marine diesel oil. The ENG.129 pump has encountered no difficulties when pumping fuels of this nature, and it is a Ministry of Supply requirement that turbojet fuel pumps should be capable of operation with such a wide range of fuels with or without contained lubricant.

The new Dowty pump has already passed its 500 hours M.o.S. test and is a fully proven product. A particularly attractive feature is that all component parts are interchangeable with other Dowty pumps of similar types. Servicing presents no difficulties; in fact, in this respect, the interchangeability is a great advantage.

The endurance test schedule applied to the prototype ENG.129 included a 500 hour non-stop run at 3,500 r.p.m. and 1,000 lb. per sq. in. delivery pressure. A check inspection of all moving parts was then undertaken; the official report upon this inspection stated that no measurable wear had occurred. The pump was re-calibrated after assembly when the delivery was measured within 0.198 per cent of the rate recorded in the original test run. This order of performance is maintained by strict inspection and control of all the British-built units.

As shown by the performance curves, the maximum delivery from the pump is 1,500 gal/hr at 1,000 lb/sq in. It is worth noting that the seals which contain this pressure within the separate chambers of the pump are all of the simple ring type developed by Dowty Seals, Ltd.

As we remarked at the beginning of this account, the acceptance of a unit for production in the United States of America is an indication that it surpasses anything else at present available either in that country of in Europe. The ENG.129 pump is being supplied to the United States for installation in the Curtiss-Wright J-65 Sapphire turbojet—an engine whose acceptance by several American airframe manufacturers as the standard power unit of more than six of the most important current American aircraft can be taken as a better indication of its merit than any claim by the engine maker. This American Sapphire, which has been developed from the original 7,200 lb-thrust Armstrong Siddeley engine of several years ago, has been Americanized in many respects, particularly with regard to the auxiliary equipment. But the Dowty ENG.129 pump has been retained to supply these engines with fuel, and to this end the pump is to be manufactured in the U.S.A. by Thompson Products Inc. of Cleveland, Ohio.

HIGH-ALTITUDE ROCKET RESEARCH

THE United States Naval Research Laboratory has ordered from the Glenn L. Martin Co. four more Viking rockets, thus enabling the current upper-atmosphere research-programme to be continued. The rockets will be of the latest (No. 9) type, which are 42 ft long and of slightly larger diameter than previously, so as to accommodate more fuel. The Viking is, of course, a slimmer and improved version of the German V.2, powered by a liquid-oxygen/alcohol rocket built by Reaction Motors Inc.

The Viking holds the world's altitude record (135 miles) for single-stage rockets: the absolute-altitude record stands at 250 miles, set up by a two-stage V.2/*WAC Corporal* missile.

All rockets used in the N.R.L. programme are fitted with recording and transmitting equipment, so that information on cosmic rays, radiation, the nature of the ionosphere and general meteorological phenomena can be relayed to earth for study.

I.A.L. CONTROL DESK FOR BITTESWELL

SO satisfactory has been the operation of the new air traffic control desk installed at Hawkers' Dunsfold airfield by International Aeradio, Ltd. (see *Flight*, July 4th, 1952) that Armstrong Whitworth have now ordered a similar installation for their airfield at Bitteswell, near Rugby.

The new equipment will be a single-position desk with one navigational section, and facilities will include a four-channel R/T. control panel, a plotting map on the navigational section, one remote indicator for the Marconi V.H.F. D/F. AD.200, and a flight-progress board which will be mounted independently. Radio equipment will include four Pye V.H.F. transmitters and three receivers, and the whole system will operate in conjunction with certain other Marconi V.H.F. transmitters and receivers and the AD.200. One Pye mobile V.H.F. installation is also being provided for the crash tender.

LIGHTWEIGHT versus HEAVYWEIGHT

Whale-spotting from a Light Aircraft: A Vivid Account from Australia

THERE can seldom have been a more convincing tribute to the reliability of the modern light aircraft than the story below, related in a letter to Auster Aircraft, Ltd., from Mr. J. Pekin of Maylands Aerodrome, Perth, Western Australia. Mr. Pekin owns an Aiglet, which he uses on whale-spotting expeditions for the Nor-West Whaling Company, whose station is at Point Cloates, 660 miles north of Perth. The makers of the aircraft, incidentally, state that over 100 Austers are now in use in the Antipodes, on a great variety of duties ranging from "flying-doctor" operations to whale-spotting of the kind described on this page.

DUE to the seasonal migration of the Humpback whale, the catching season is comparatively short, being 3-3½ months of the year, July to early October; therefore whale catching is carried on at a rather fast tempo during the time available.

The whaling company employs three catcher boats, plus myself with the Auster Aiglet, and whale catching is carried out every day, weather permitting.

As the station is based at the most western point of our north-west coastline, we experience a certain amount of rough weather. In the 1952 season the station did not catch the allotted 600 whales; the total catch was 536 and this was mainly due to rough weather conditions.

The normal procedure is for the catcher boats to leave their moorings and pass through the passage in the reef at dawn. I follow very soon after; that "soon after" part causes quite a little leg-pulling, the catcher-boat crews wanting to know why I am not out over the sea, with whales sighted for them, as they come through the reef. As it happens, I am the first man on the station to have breakfast, followed by a twenty-minute drive over seven miles of rugged trail to the landing strip which is near the coast south of the station.

I take off as the sun cracks the skyline and fly out over the reef, just after the boats. The boat crews, on the other hand, have their breakfast at a much more gentlemanly hour, after getting out to sea. They are all very nice fellows really, and quite often invite me down for a cup of coffee. Unfortunately, as they well know, I cannot accept the invitation.

Each of the catcher boats, the shore station and the Auster are fitted with radio telephone, and the hunt for the humpback goes on. This is carried out either north or south of the station, depending on the run of the whales and as far as twenty miles out to sea. Here, more than any other time, my faith in the Auster and her Gipsy Major engine are put to the test—there must be no doubt in one's mind concerning possible failure.

Flying altitudes vary according to weather conditions. When it is fine and calm I fly up to 1,000 ft. In rough weather I am compelled to fly low, the rougher the weather the lower I have to fly, my minimum being 200ft at speeds mainly around 60 m.p.h.

When I spot a blow I inspect the whales for type, number and size and report over the radio telephone to the catcher boats, giving details and position; the catcher boats then race in for the chase and kill. During the actual chase, the aircraft assists to a large extent, giving directions over the radio as to the whales' position, heading, etc. Believe me, I see some very exciting battles.

Contrary to the belief of many people, the whale is really a very agile animal. I have repeatedly seen 40-ton humpbacks rush out of the water and do a very neat half-roll before hitting the water again. Occasionally, with the more aerobatic-minded fellows, they can nearly complete a full roll—a very thrilling sight, particularly when the 40-50 tons of beef hits the water with a crash and splash that goes 30ft into the air.

For whale-spotting purposes, I have developed the old technique of flying wholly and solely by the seat of my pants, completely disregarding instruments, except for oil pressure. There are so many things to do—keeping the boats advised; watching the whales both on the surface and, for as long as possible, under the surface; scanning the sea for any other blows that may appear; endeavouring to keep three catcher boats busy. The result is that the Auster and I have grown to be one complete unit, the remark of a passenger one day being "She turns over the whales by herself." At times I felt as if she did, too.

Many and numerous are the occasions in these warm waters when I have seen up to one hundred sharks of lengths up to twenty feet attacking a wounded or killed whale. They can consume a 40-ton whale in thirty minutes! It still has the power of sending cold shivers up and down my back, and rather forcibly presses home the need for good maintenance. Being a certified engineer, and doing all my own maintenance during the whaling season, I can assure you that I take particular care over maintenance details, particularly the fuel system.

Flying the Auster, I left Perth for Point Cloates on July 2nd and returned on October 12th. During those 103 days I flew 680 hours 25 minutes. All this flying, with the exception of approximately twenty hours, was done over the sea.

Having completed about 2,000 hours on the Gipsy-Major-powered Auster, covering a large variety of work, I have come to trust the reliability of this combination above all others. As a one man, one aeroplane, self-contained unit, this whale spotting episode of 680 hours flying in 103 days will, I venture to think, take some beating.

TWO IMPORTANT LECTURES

DETAILS of two important lectures are announced by the Royal Aeronautical Society. The ninth British Commonwealth and Empire Lecture, on June 11th, will be delivered by Sir Hubert Walker, C.B.E., chairman of West African Airways Corporation, whose subject will be *Some Problems in the Development of Air Transport in West Africa*. Three months later, on September 14th, the 41st Wilbur Wright Memorial Lecture, briefly entitled *Structures*. will be given by Professor N. J. Hoff, F.R.Ae.S., F.I.Ae.S. Professor Hoff is Head of the Department of Aeronautical Engineering and Applied Mechanics at the Polytechnic Institute of Brooklyn, N.Y.

NATO CO-OPERATES WITH ASLIB

THE Aslib Aeronautical Group states that it has received gratifying encouragement in its work by a request from the Advisory Group for Aeronautical Research and Development (AGARD) of the North Atlantic Treaty Organization to participate jointly in the Group's second annual conference.

As a result, some alterations in the conference programme previously announced have become necessary, but all the papers which have already been promised will be presented. The conference will be held from Friday, March 27th, until Tuesday, March 31st, at the College of Aeronautics, Cranfield.

Delegates will assemble on the Friday evening. The A.G.M. of the Aslib Aeronautical Group will be held on the Saturday morning, and in the afternoon there will be a session on the cataloguing of aerodynamic data, with special reference to the Dutch scheme set out in N.L.L. Report No. 116. The conference dinner will be held in the evening, preceded by a cocktail party. On the Sunday, there will be a full-day discussion on a common international system for indexing, abstracting and cataloguing all aeronautical reports, and representatives of NATO states have been asked to give their views on these problems and to contribute papers describing present practice in their own countries. A film show will follow. The Monday will be devoted to further discussion of points arising from the Sunday session; and the final meeting, on the Tuesday, is for AGARD delegates only, to decide on the action to be taken on the matters discussed.

The chairman on the Sunday, Monday and Tuesday will be Professor A. A. Hall, Director of the Royal Aircraft Establishment.

The conference fee will be £1 5s., including preprints, membership of the College club, and transport from Bedford railway station; board and accommodation will be provided at £1 5s per day. Further particulars may be obtained from Mr. C. W. Cleverdon, College of Aeronautics, Cranfield, Bletchley, Bucks.

A.F.R.Ae.S. EXAMINATION RESULTS

THE Royal Aeronautical Society has announced the undermentioned list of names of candidates successful in the December, 1952, Associate Fellowship examination:—

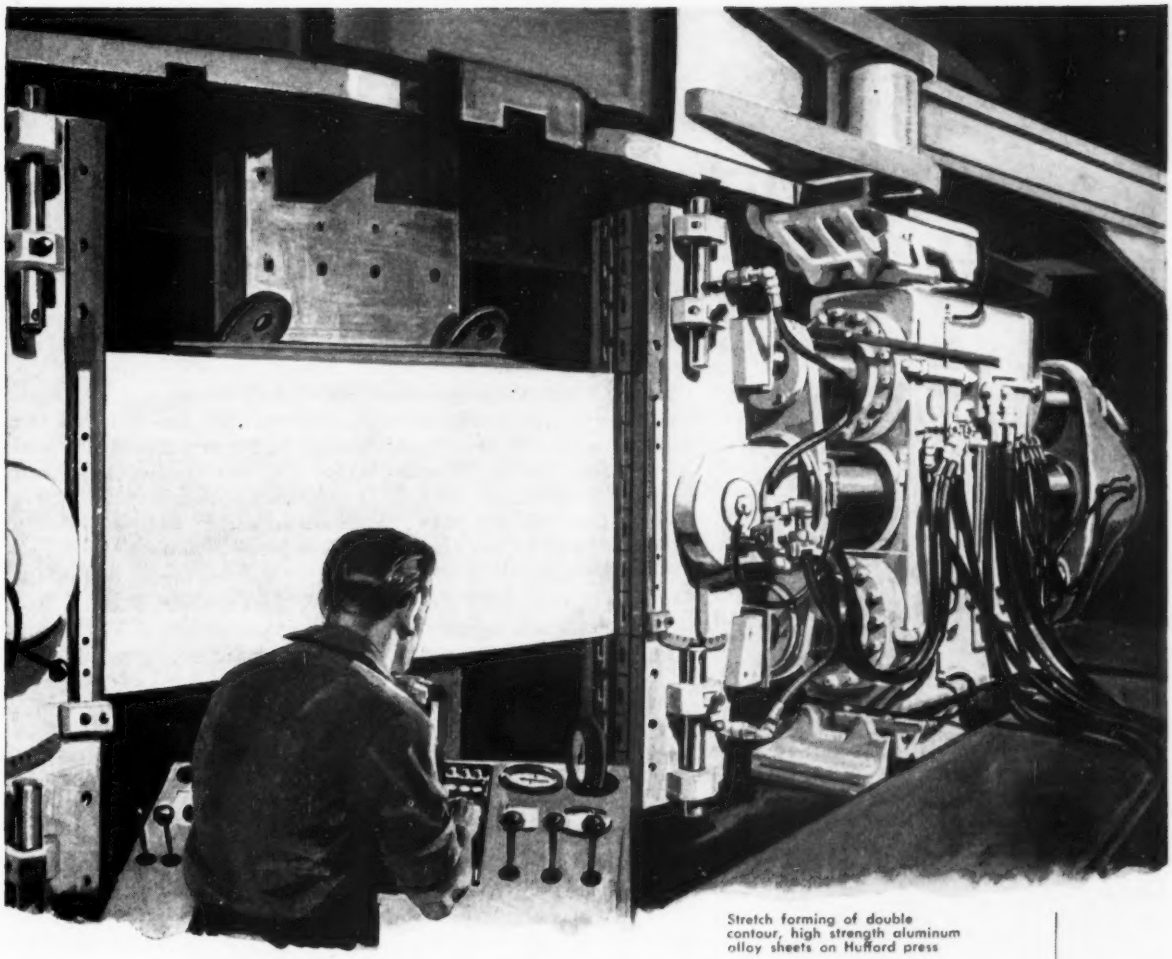
Part I (Home).—D. G. A. Bridgnell, D. R. Brodie, K. G. Draper, J. W. Drife, D. J. Frater, D. R. Henbest, J. L. Johnston, T. C. Lee, J. MacNaughton, K. J. Neeves, K. G. Page, N. R. Reddy, D. J. Richardson, R. D. Saha, B. Singh, R. P. Stanford, I. K. Trundley, P. Shu-Yan Wong.

Part I (Abroad).—W. K. Aiyadurai (Melbourne, Australia), K. S. Chandrashekaran (Bangalore), S. Singh (Delhi), A. Subrahamanyan (Bangalore).

Part II (Home).—P. J. Farmer, D. W. Pickston, C. R. Raynham, D. Rowe, P. Simpson, I. H. Smart, F. L. G. Wood.

Part II (Provincial).—A. G. Creak (R.A.F. Cirencester), W. J. Hanlon (Belfast), W. F. Meichan (R.A.F. Aldergrove).

Part II (Abroad).—A. F. El-Kerdani (Heliopolis), P. Krishna Iyer (Madras), R. B. Lal (Madras).



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B.O.A.C.'s six European

London

From *LONDON* the air routes of B.O.A.C. stretch out westwards across two thousand miles of ocean to Canada, the United States and the Caribbean. To the south they reach as far as Buenos Aires and down to Johannesburg. Eastwards they pass over Europe, Asia Minor and Asia itself, across a whole hemisphere to Australia and Japan. London, then, is the gateway to the entire world ; but not the only gateway of B.O.A.C. For in Europe there are five others.

LISBON was the first of B.O.A.C.'s post-war gateways on the continent of Europe. In fact, for most of the war years, B.O.A.C. had been operating services for the Government to this city, one of the few in Europe where lights shone a welcome to approaching aircraft. In 1947 British South American Airways extended the London-Lisbon services to West Africa and South America. When B.S.A.A. merged with B.O.A.C. in July, 1949, the Corporation assumed responsibility for flights to and through Lisbon. Today B.O.A.C. airliners land here on the first stage of their flights to Dakar, Recife, Rio de Janeiro and São Paulo, Montevideo, Buenos Aires and Santiago.

B.O.A.C. began post-war services to *ROME* on 25th August, 1947. At that time Rome was a staging-post on the London-Marignane-Rome-Athens-Nicosia-Lydda-Baghdad-Tehran route. Today, five years later, Rome is one of the busiest ports of call for B.O.A.C. airliners on the way to all Africa east of Tripoli, to the Near East, India and Pakistan and the Far East, Japan and Australia. And nowadays, above the

Lisbon

Madrid

gateways to the world

ancient city, the *Comet's* jet engines are an everyday sound in the sky.

Another B.O.A.C. European gateway opened its way to the world on 31st October, 1950, when flights began through *MADRID* to West Africa and South America. Businessmen with interests in South America were quick to take advantage of these fast, regular services. Now Rio de Janeiro is only 26 hours from Madrid ; Buenos Aires only 34 hours.

For the first time, in March 1951, B.O.A.C. began to operate via Switzerland. *ZURICH* became one of the destinations on the route to the Middle East. It is now a familiar airport to B.O.A.C. crews flying passengers and freight not only to the Middle East but to the Far East, Japan and Australia.

The latest B.O.A.C. gateway is *FRANKFURT-ON-MAIN*. In April 1952, services began from Frankfurt through London and Rome to cities on all six continents, over B.O.A.C.'s world-wide network of air routes . . . Attainment in plenty ; but B.O.A.C. is not content to rest on its laurels. Travellers from all the nations of Europe know and appreciate B.O.A.C. speed, reliability and courtesy ; they know, too, that they can look to the British Overseas Airways Corporation for ever-increasing heights of achievement. For constant endeavour is the hallmark of this great enterprise.

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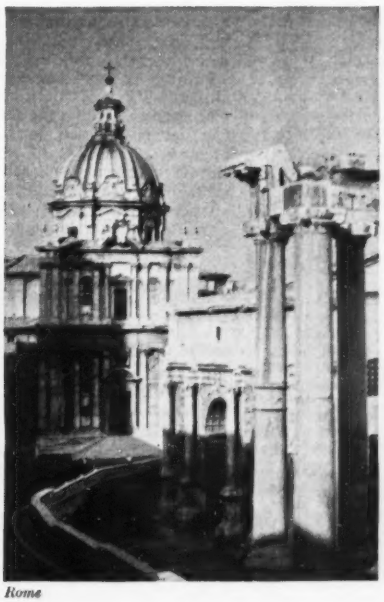

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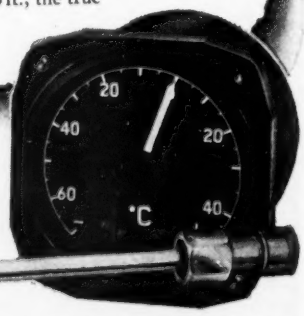
Weston Thermometry has been chosen for several applications on the De Havilland 'Comet' including fuel temperature, cabin air temperature, wing and tail de-icing as well as outside air temperature.
Illustrated is the Model S.110G/9 Thermometer Bulb with its associated Indicator, the Model S.63 circular scale Ratiometer used for outside air temperatures.

Flight Planning The air temperature is one of the most important factors in the operation of a long-range jet aircraft as it influences the rate of climb, the heights at which the aircraft will cruise, and hence the true airspeed. The latter in turn determines the specific range (air miles per pound of fuel) since within limits, fuel consumption per hour at the normal cruising altitudes does not vary much. It can be seen therefore that air temperature controls the choice of flight path, largely determines the fuel load carried, and governs the whole economy of the operation. The effect of air temperature on Comet operations can be illustrated by the fact that a 10°C. rise in temperature reduces the cruising altitude by 2,000 ft., the true airspeed by 13 knots, and the cruising specific range by 2%.



From the article "Operating the Comet" by D. O. MacDougall in the May issue of Shell Aviation News.

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Discussing Helicopter Maintenance

Further Opinions at the Helicopter Association Meeting

THREE of the main papers given before the Helicopter Association on Saturday, February 7th, at the Royal Aeronautical Society were summarized in last week's issue of *Flight*. Mr. A. McClements, A.R.T.C., M.I.Mech.E., of the Ministry of Supply, spoke on the general background of maintenance; Mr. J. H. Spaull, of the Air Registration Board, described the licensing procedure for helicopter maintenance engineers; and Mr. H. E. le Sueur, A.F.R.Ae.S., also of the A.R.B., considered helicopter airworthiness requirements.

The practical aspects of the maintenance of helicopters was the subject of a paper by Mr. W. L. Shippey, a maintenance engineer of the B.E.A. Helicopter Unit, and a summarized account of this contribution, and of the remaining discussion, follows.

The lecturer opened his remarks by pointing out that a helicopter engineer must obtain both his A and C licences from one examination. It was known that every helicopter power plant, although of a standard basic design, was specially modified for its job; and this point, together with the fact that the helicopter's transmission system was so akin to engine practice, made it most desirable, even essential, that the engineer signing his Certificate of Safety for Flight certified the engine as well.

After commenting on specific points from the licensing syllabus, Mr. Shippey suggested that lubrication—a vitally important part of helicopter maintenance—should perhaps be included.

The maintenance system as practised by the B.E.A. Helicopter Unit did not differ basically from those in use by the two Corporations and the charter companies. A progressive system of checks was carried out in the cycles of flying time laid down in a master schedule and approved by the A.R.B. During the Liverpool-Cardiff operations with S-51 helicopters operating on the 5-25-100 hr cycles, the following schedule was adopted: Check 1, at 5 hr (daily); check 2, at 25 hr; check 3, at 100 hr; check 4, at 200 hr; and check 5, at 400 hr.

Checks 1, 2 and 3 were purely maintenance inspections of the complete airframe, engine and ancillaries, whereas checks 4 and 5 were component-changes. There were further checks at multiples of 400 hr for such items as fuel tanks and undercarriages; also, the engine had an overhaul-life of 700 hr. Broadly speaking, every component was changed once or more times during each 1,200-hr period.

Reverting to the progressive portion of the maintenance schedule, i.e. checks 1, 2 and 3, it would be remembered that at each check 1 there was carried out part of check 2 and part of check 3, so that at the end of every 25 hr of flying, the check 2 cycle had been completed, and likewise at the end of every 100 hr, the check 3 cycle. Whilst this method had the disadvantage of using up more man-hours on actual maintenance, it had been found possible to utilize the aircraft continuously, thus obviating the need to withdraw it from service for periods of from one to three days to carry out the 25- and 100-hr inspections.

For future operations, however, especially where an operator was employing much larger fleets of aircraft on high-intensity services, it was doubtful if there would be any advantage at all in the progressive system.

The maintenance system in the B.E.A. Helicopter Unit had been slightly modified some six months ago, continued the speaker. Previously, all maintenance work had been inspected by full-time licensed inspectors, although this was not strictly necessary under the terms of the Corporation's inspection approval. Now, however, licensed engineers were employed to carry out the actual operations, to supervise unlicensed personnel, and to sign for their own work—a much more efficient method.

Overhaul work contained anomalies, however. Although this work required an equal or a higher degree of skill, it could be certified by a virtually unqualified inspector (there being no helicopter "B" or "D" licence), while the licensed engineer could not certify anything that was not strictly included in the terms of his "A" and "C" licence. Something like a Board of Trade certificate, to replace the "B" licence and to serve as an inspector's qualification, was the speaker's suggestion.

Speaking of defect diagnosis, or "trouble-shooting," Mr. Shippey said that his material for this part of the lecture had been accumulated over a period of seven years of operation and maintenance of five types of helicopter, i.e. R.4, R.6, Bell 47-B3 and Bristol 171 on experimental flying, and that old faithful the S-51.

The helicopter as such had proved amazingly reliable; the majority of faults had occurred in ancillary equipment, such as electrics, instruments, radio, etc., and could occur in any aeroplane.

Vibration had proved one of the chief sources of worry to helicopter engineers and operators. The main concern of the maintenance engineer was to be able to form a rapid and accurate opinion as to the seriousness of the trouble. It was here that the pilot, in making his report, could provide valuable help by giving a concise and accurate description of the symptoms.

There was no hard-and-fast set of rules, however, which could be applied in all cases, and past experience had shown that it was only by a sometimes tedious process of trial and elimination that the faulty part could be brought to account. Even then there had been cases where a perfectly serviceable rotor head or set of blades had given continual trouble on one aircraft and had been quite acceptable on another. Other causes of roughness on the S-51 had been faulty tracking, backlash in controls, or brinnelled bearings. These invariably showed up as "stick-stirring" and were more or less obvious. They could usually be detected by test flying or close visual inspection.

The Bell 47-B3 had been, in general, less problematical than the S-51. There had been only one instance of roughness in the Bristol 171, and that had been cured by tracking the blades. Indeed, one of the most outstanding qualities of this aircraft was its remarkable smoothness—probably due to the greater flexibility of the rotors and its higher rotor r.p.m.

Maintenance on a B.E.A. Sikorsky S-51 at Gatwick. Mr. Shippey, of the Corporation's Helicopter Unit, spoke on such work from the ground engineer's viewpoint at the recent Helicopter Association meeting.

The number of snags encountered in gearboxes, clutches, fans, driveshafts and couplings had been conspicuous by their absence. This applied to all the Corporation's helicopters. It had been necessary to contend with no more, and no less, than the normal number of engine snags.

Most of the other troubles encountered had recurred in spells, and in some cases had been obviated by modification action. Many man-hours had been used up in the rectification of cabin heaters and rotor brakes, both weak points on the S-51. These faults would not ground a machine or cancel a service, however, and engineers were entitled to use their own discretion in the event of a last-minute failure of this nature.

There was sometimes a tendency, in the interests of speed, for maintenance engineers to remove complete components for replacement in the event of trouble. Closer investigation could in many cases reveal that the fault lay in some very small part of the component or perhaps in the need for slight adjustment. It was stressed, therefore, that to avoid cases of engineers having cured the trouble without knowing the cause, all information from investigations should be made available to maintenance personnel.

It was conclusive that the overhaul-life of some of the less important components could be extended and in some cases doubled with beneficial results. The lecturer concluded by quoting a recent case of an aircraft being grounded for a fortnight because two replacement auxiliary fuel-pumps both leaked, whereas the one that had been removed, time-expired, was functioning perfectly.

The Open Discussion

FOLLOWING the reading of the four main papers, and a break for tea in Londonderry House, the chairman, Mr. J. Shapiro, Dipl.Ing., A.F.R.Ae.S., invited general discussion on what had been said.

The first speaker was MR. B. S. SHENSTONE, M.A.Sc., F.R.Ae.S., A.F.I.Ae.S., chief engineer, British European Airways, who questioned the wisdom of the main speakers' modesty in strenuously denying that their views were those of the bodies they represented. The engineers could reduce unnecessary aircraft time on the ground, he continued, by making the machines available at the right time of day—or by making the traffic staff use them whatever the time of day. While the worth of the unlicensed expert in particular cases should not be underestimated, it was a fact that many of B.E.A.'s helicopter inspectors did possess licences.

MR. W. TYE, O.B.E., B.Sc., F.R.Ae.S., of the A.R.B. expressed the (personal) view that, in helicopters, there were "just too many things that whizz round and waggle," and that this resulted in their being more prone to failure than things which stayed relatively still. The degree of reliability must be improved, he continued, for even with well-tried aircraft engines, catastrophic failures still occurred. Admittedly, these remarks applied mainly to the design staffs, but licensed engineers, nevertheless, had an important responsibility to eliminate serious defects.

The importance of the Navy as a source of potential civil maintenance engineers was stressed by CDR. R. H. WEBBER, R.N., of R.N. Air Station

DISCUSSING HELICOPTER MAINTENANCE . . .

Gosport, who went on to suggest design amendments, in addition to "life" amendments, on failure of a component. The proper time for this, he continued, was before the prototype-testing stage. Design for maintenance also was vitally important, and obviously had a direct effect upon the ground engineer's work. Chief designers might indeed do worse than carry out just one ground inspection themselves. High standards were necessary; for the less obvious defects there remained the need for better-qualified engineers.

MR. J. LEASON, a member of the Society of Licensed Aircraft Engineers, referred to the possibility that a chief inspector might not possess licences; this was a bad thing, if standards of maintenance were to be kept up. He also protested at the withdrawal of the six-monthly check on licensed engineers by A.R.B. surveyors; for without this supervision, apathy and inefficiency could result.

The progressive maintenance system was suitable even when the operator's future programme was not known much in advance, stated MR. W. G. CARTER (chief inspector to Pest Control, Ltd.), who based his remarks on his own company's varied experience. He hoped Mr. Spaull's reference to the absence of "B" and "D" licences was not final and enquired whether the A.R.B. would certify operators to overhaul their helicopter engines without "D"-licensed engineers. For the vigorous existence of the crop-spraying helicopters, scrap lives were a most important problem.

The very bad economic effect of random unserviceability was emphasized by MR. N. E. ROWE, C.B.E., B.Sc., D.I.C. Co-operation between designer and ground engineer was absolutely essential, he continued, and the expense of extensive and early type testing would be more than repaid by the results. The maintenance engineer could maintain only what he was given to maintain, and the designer could not judge everything, but together they could effect a considerable improvement.

MR. SHAPIRO reinforced Mr. Tye's emphasis on the rotating aspects of helicopter components, which made the rotor assembly essentially different from both a normal engine and a fixed-wing aircraft, from the point of view of the airworthiness authorities. Increased susceptibility of the rotor hub or blade to fatigue was not the main characteristic, and "fatigue accountancy" could be over-emphasized.

The main speakers then replied. First was MR. MCCLEMENTS, who pointed out that the use of the progressive maintenance system by a non-scheduled operator, such as Pest Control, was an enormous achievement. Ground engineers should be aggressive in their approach to designers. Maintenance by night seemed advisable, and he agreed that ground simulation was important. Concerning fatigue loads, it should be remembered that these could be affected by the condition of the moving parts—the ground engineer's responsibility.

MR. SPAULL stated that the A.R.B. supervision of ground engineers still continued, and only the six-monthly reports had been dropped. The engineers' position had thus been enhanced. Engines not peculiar to helicopters could be overhauled with the existing "D" licence, but the Board was concerned mainly with installation.

MR. SHIPPEY suggested that apparently anomalous differences in experience between different operators using the same equipment could be explained by a variation in detailed types of the same unit. Night tourist flights by helicopter were a future possibility—and could result in maintenance by day.

Concluding the discussion, MR. LE SUEUR pointed out flatly that he was concerned with safety and not operating economy, and thus the design amendments suggested by Cdr. Webber might not be justifiable. Ground simulation, as Hafner had proved, could not be done, and the only way to get flight conditions, in the speaker's opinion, was to fly the helicopter.

SOME AIR-TRANSPORT THOUGHTS

A "Hastily Whipped-Up" Talk of Exceptional Value

THAT Sir Frederick Handley Page was unable to deliver his Brancker Memorial Lecture before the Institute of Transport a week last Monday was without doubt to be regretted. But, in compensation, the attack of influenza which kept Sir Frederick away enabled members to hear a notable talk, prepared at very short notice, by Mr. Peter Masefield, M.A., F.R.Ae.S., chief executive of B.E.A., and a Member of the Institute.

Introducing the speaker, the president, Mr. C. T. Brunner, referred to Mr. Masefield's monumental Brancker Lecture of two years ago. Mr. Masefield, speaking from one of the Jarvis Hall's isolated pulpits, admitted that he himself had not expected again to occupy "this hot seat"—that was, not until 1 p.m. the previous Friday. What he would give would be a "hastily whipped-up makeshift talk, rather a tourist version of the Silver Wing service expected from Sir Frederick"; and he hoped members would not be disappointed. If his introductory remarks seemed rather long—well, hey *were* rather long, but only long enough to enable the messenger, even then *en route* from Northolt, to arrive with the remaining six slides.

He would present "Some Thoughts on the Future Prospects of British Air Transport"; on entering the present phase of highly competitive tourist fares, the air transport industry was coming to a most interesting and critical stage. To be considered in turn were (1) the growth of traffic, (2) the British aircraft situation, and export potentialities, (3) the economic factors influencing the fares structure, and (4) how helicopter development would fit in with the high-speed jet transports of the future.

Mr. Masefield paid first a tribute to Sir Sefton Brancker, who, 30 years ago, had foreseen the importance of air transport for this country. The speaker's "air transport coat of arms" was then shown on the screen, and was explained. To gain the essentials of safety, speed, regularity, frequency and cheapness, the four requirements were efficient aircraft, efficient operators, efficient ground organization, and an air-faring outlook. These four factors created (i) the direct asset of air travel, (ii) the indirect asset of swift communications, and (iii) a basis for national security, and resulted in the national advantages of air transport, namely prosperity, trade and security.

Fortified by the sight of a muffled figure silently delivering the missing slides to Peter Brooks at the back of the hall, Mr. Masefield then launched into his historical account of the increase in air travel from the day in 1919 when Lt.-Col. W. Sholto Douglas (now B.E.A. chairman) had flown one of the first British commercial flights from Cricklewood to Ringway, Manchester, in a machine built by the absent Brancker lecturer, then Mr. Frederick Handley Page. The expansion in air transport, taking place during the lifetime of these two pioneers, had been amazing.

The growth of British rail and air transport, at comparable stages of development, featured a slower start for air transport, but this was followed by a more rapid acceleration. The volume of world air transport had increased at the fairly constant annual rate of 20 per cent between 1929 and 1951.

The trend of fares was a steady decrease, after a slight rise immediately following the war, until 1951, when a marked drop occurred. The downward trend of fares had broadly corresponded to an increase in the gross weight of the aircraft used, and to an increase in "airplane" speeds (an unamended graph of transatlantic origin again indicating the paper's speedy conception).

Present British types were then illustrated. First to be shown was the Elizabethan—"probably the last piston-engined airliner to be used," commented Mr. Masefield, "except by the Americans, who seem a little behind in their thinking." The Viscount, Comet, Britannia and Vickers V.C.7 were then discussed, and the decrease in operating costs with each development was emphasized. Whether the low fares to be offered would bring sufficiently high load factors, with regularity and high efficiency, would be an important question.

And what would be the world market for these aircraft? Mr. Masefield guesstimated that potential sales of Viscounts and Comets from 1952-55 could realize some £100 million; while during the next phase, from 1955-58, sales of the Viscount 800, Comet 3 and Britannia could bring in about £500 million.

The speaker's well-known mastery of airline economics then came to the surface, in a concise account of the main economic factors in aircraft operation. A major trend was for the reduction of costs on long-distance routes, which corresponded to the increased utilization made possible with increasing stage lengths. The importance of matching aircraft to routes was emphasized, by reference to curves showing the variation of payload, cost, and break-even number of passengers, with stage length.

The amazing success of the B.E.A. £8 winter return fare from London to Edinburgh and Glasgow was then illustrated. This fare, at about 3d per passenger-mile, lay between the first- and third-class rail fare, and had resulted in a marked increase in traffic (in spite of fogs) and a very large surplus of revenue over marginal costs. The lecturer was flattered to note that the railways had eventually realized the advantage of following B.E.A.'s lead, as expressed that day in fare reductions over the same routes.

Mr. Masefield's concluding section concerned the future use of the helicopter, and was based on the opinions expressed in his recent lecture (see *Flight*, November 14th, 1952) before the Helicopter Association. The use of twin-engined machines for city-centre operation was essential, for emergency parachute descents on to the tops of competing forms of transport could not be tolerated.

The main trends in air transport, Mr. Masefield concluded, were for higher cruising speeds and lower fares. The future might consist in two types alone; the large turbojet airliner for long-range work, and the twin-engined helicopter for the shorter routes. But, whatever form future progress took, we were at present still in the early stages; in the very big developments ahead, one did not have to be crazy but, as always in aviation, it did help.

Appreciation of Mr. Masefield's talk from the transport-minded audience was quick and generous—a tribute to the enthusiasm and humour with which the air-faring outlook had been presented. But, following the applause, discussion opened with two aggressive questions from railway believers. First, were not the lecturer's cost comparisons invalid, due to the omission of the airline's share of airport costs? No, seemed to be Mr. Masefield's reply, as he protested that the airlines paid much too much anyway. Until airports could be made self-sufficient by revenue from their amenities, he continued, why not debit part of their expense to national security?

And might an equal share of railway costs be similarly debited, came the immediate query from a second member of the wheels-and-rails fraternity. "Why not?" smiled the lecturer, pointing out the futility of seeking consistency while B.E.A. paid a *road fund* tax on petrol. Mr. S. Scott-Hall, of the Ministry of Supply, then called attention to the importance of his Ministry in the development of new aircraft; Mr. Masefield agreed, and mentioned how much more he would agree when B.E.A. received their big helicopters.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

British Technicians in America

I AM afraid this letter is way behind J.H.W.W.'s article, "The Technician's Dilemma," of November 14th, that particular copy of *Flight* having only just come into hand.

As, however, one of those recalcitrant engineers (who besides "drifting" have also been the target of much adverse criticism) may I offer not an apology but some of the reasons for our secession? Two points should be clarified in the first place: (1) It is not the unmarried and untied boys who are moving; in my particular firm, the greater percentage of the influx are married, and have a minimum of two children. (2) By the same token, a large number of us had a considerable backlog in seniority in our late firms and are not those who tend to make the "floating" section of so many design-offices.

Basically, each of us had the same reason for making the break, i.e., frustration. When a great number of years have been spent in reaching for the particular "star" to which one has hitched his wagon and, looking forward, one can see not only an equal number of years still reaching, but also the continued fighting of a losing battle against non-co-operation and with people to whom status apparently means more than the job—then you either start again or merge with the "mob."

We, the "drifters," have started again—literally and figuratively. That word "security" (which will be the destruction of any country which adopts it) is gone from us—probably forever! In its place we have substituted hard work and the power of our own elbows. Maybe we are dreaming, but at least we are trying.

Incidentally, other things help quite a lot, e.g., good and plentiful food and a living salary.

Van Nuys, California. F. T. BEVAN, A.F.R.Ae.S.

Sabre Personalities

CONGRATULATIONS on your very fine article (January 30th), by H. F. King, dealing with the North American F-86 Sabre series. The centre-page sectional drawing by Arthur Bowbeer, and John Yoxall's magnificent photographs, were a real joy to study.

I have only one criticism to make. Why, in his short introductory history on the Sabre's background, did the author make no reference to just two of North American's executives whose great job of work on this aeroplane is surely worthy of even brief reference? I am referring to George Welch, who was test pilot in charge of the original XP-86 project back in 1947, and A. F. "Tony" Weissenberger, chief designer (or, to give him his correct title, chief project engineer i/c.)—which, in fact, Mr. Welch now is.

Welch has the distinction of being the first American pilot to fly an aeroplane with swept-back wings. He piloted the XP-86 prototype on its first flight, on October 1st, 1947, and, for the record, logged over 200 hours of test flying on both the XP-86 and the XF-86A prototypes—the latter making its first flight on May 18th, 1948 (not May 20th as stated in your article). U.S.A.F. serial numbers of the two now-famous prototypes were 45-59597 and 47-605 respectively. Another point: only 33 F-86As were originally ordered by the U.S.A.F. in 1947, but this number was increased to just over 700 when the prototype proved its superb performance and handling characteristics.

Asmara, Eritrea. DENNIS M. POWELL, F.R.G.S.

Coronation-film Comet?

RECENTLY it was reported that three American companies have chartered aircraft to fly films of the Coronation to America for screening on TV and that there will be a race to be the first to show the film; one firm has arranged a dispatch rider, helicopter and Constellation link-up to get the film to New York in twelve hours (flying direct, with extra fuel).

Here, surely, is the chance of the century for Britain to beat the Americans at their own game. In the Comet 2 we have an aircraft capable of crossing the Atlantic considerably faster than the Constellation, or any other U.S. airliner; exactly how much faster will depend upon prevailing conditions. The film could be flown by helicopter from the South Bank Site to Hatfield or London Airport; it could be processed in a special dark-room in the fuselage of the Comet, which might also carry extra fuel for the direct flight to New York.

Such a means of delivery could have a very great propaganda value; the Americans are impressed by speed, and a suitable explanation of the method, together with pictures of the Comet, might be included as a preface to the film.

Cambridge. PEDANTICA.

"Saint Nevin's" Track

HAVING vivid memories of R.A.F. Station Pwllheli when it was an armament practice camp, I was shaken to find Nevin occupying the same geographical position in your "official diagram of tracks, etc.," on page 164 of your issue of February 6th. Nevin is, of course, on the north side of the "Lleyn," 52° 56′ north, 04° 31′ west.

This in no way affects Capt. White's argument, but if this was a diagram as used in the *Saint Kevin* enquiry, it does open possibilities.

No normal pilot/navigator misplaces sea and land, but he can, and does, err badly in ground speed. I once crossed Scotland above cloud in an Anson without believing it, due to an unforecast 100 m.p.h. following wind. With poor downward visibility, and a fleeting glimpse of the ground it would be possible to mistake a town on the main coast—say Harlech for Nevin. It is extremely unlikely that any place on the southern side of the "Lleyn" could have been so mistaken.

It needs no words of mine to explain how the remainder of the tragedy could have been played out if this were indeed so.

Reading, Berks. L. STACK, F/L.

[Enquiries have revealed that the "Nevin" shown on the map—which latter, we understand, was not prepared by the Ministry of Civil Aviation—was not the town but the Nevin beacon, the co-ordinates of which (52° 53′ 33″ N, 04° 25′ 57″ W) place it as it was shown, on the south side of the peninsula.—Ed.]

"Axed" Traffic Controllers

A GREAT deal has been said and written about the plight of the civilian flying instructors made redundant by the closing down of the basic flying training schools.

I would like to point out that there is just as important a body of specialists affected, even more so—the air-traffic controllers. These men carry out a most important rôle in the sphere o flying today, and their work is repaid by a pitiful salary, approximately five-eighths that of a Q.F.I. I would also point out that saving one aircraft from damage or destruction, would pay a controller's salary for ten years.

Some have had highly specialized flying experience also, and the chances of employment in aviation are even more remote than for the Q.F.I.s, due to age, being out of flying practice, and without the opportunity to have saved on their poor salary.

I have no doubt that others have suffered the same experience as myself when applying for employment in a comparatively new field. You get an application form, fill it in and return to the company or organization concerned, and back comes a polite letter—"sorry, no suitable vacancy."

As far as I can gather the reason is that we are grand old men of over 30, and/or have spent too many apparently useless years in the service of our country.

Coventry. J. BODDINGTON.

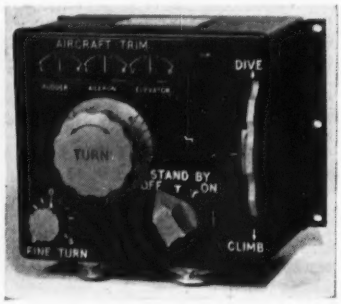
FORTHCOMING EVENTS

Feb. 20. Institute of Navigation: "Navigation and the Operation of Jet Aircraft," by Capt. R. C. Alabaster, D.S.O., D.F.C.
Feb. 21. British Interplanetary Society (Manchester): "Structural Problems of the Lunar Base," by P. L. Sowerby.
Feb. 21. British Interplanetary Society (Yorkshire): "Construction of Bases on Other Worlds," by M. S. Wright.
Feb. 24. S.L.A.E. (Bournemouth and Christchurch Branch): "Flying Instruments and Equipment," by A. York-Bramble, A.R.Ae.S., M.A.(Oxon), F.R.Met.S.
Feb. 24. R.Ae.S. Graduates' and Students' Section: "Viscount Operations," by Capt. R. Rymer.
Feb. 25. R.Ae.C.: Britannia Trophy Dinner.
Feb. 26. Aerodrome Owners' Association: A.G.M. and Annual Dinner.
Feb. 26. R.Ae.C.: Film Show.
Feb. 26. R.Ae.S.: "New Materials and Methods for Aircraft Structure," by H. J. Pollard, Wh. Ex., F.R.Ae.S.
Feb. 27. A.T.A. Association: Annual Reunion Dinner.
Feb. 28. S.L.A.E.: "Aircraft Fire-protection Equipment," by R. W. J. Cockram, A.M.I.E.E., A.I.Mech.E.
Mar. 6. Helicopter Association: Discussion on Flight-testing Experiences: contributions by C. T. D. Hosegood, S/L. W. R. Gellatly and Capt. J. A. Cameron.
Mar. 7. British Gliding Association: International Contest Victory Ball.
Mar. 7. British Interplanetary Society: "Fabrication of the Orbital Space-vehicle," by K. W. Gatland, A. M. Kunesch and A. E. Dixon.
Mar. 12. R.Ae.S.: "High-performance Jet Aircraft," by S/L. W. A. Waterton, G.M., A.F.C. (at Derby).
Mar. 14. British Interplanetary Society (Birmingham): "Artificial Satellites," by H. E. Ross.
Mar. 14. The Cranfield Society: A.G.M. and Dinner.

THE INDUSTRY

A New Autopilot

PERMISSION has now been granted for the Sperry Gyroscope Co., Ltd., of Brentford, Middlesex, to announce that they have developed a new precision automatic pilot for new aircraft for the Royal Air Force and the Royal Navy. The only photograph at present cleared for publication is that reproduced here, showing the pilot's controller.



The pilot's controller of the new Sperry autopilot, which offers unusually clear presentation.

The new autopilot, which is now being put into production, has a number of original features that make it suitable for installation in modern high-speed aircraft. Sperry also announce that the complete installed weight is significantly less than that of other contemporary autopilots. Further details are awaited with interest.

Folland Apprentice Prize-giving

AN audience of 600, consisting of apprentices and their parents, was present at the recent apprentice prize-day of Folland Aircraft, Ltd., held at Southampton.

In his speech as chairman, Mr. E. N. Egan (director and secretary of the company) referred to the introduction of a commerce and accountancy training scheme, operated on similar lines to engineering apprenticeships.

Announcing the successes of the apprentices, Mr. J. Dynan (education officer) mentioned the award of an S.B.A.C. scholarship to C. Norbury, and major scholarships to the College of Aeronautics, won by K. Lane and F. Jarlett. Major scholarships had also been awarded to H. Hudson and B. Tuchenor for training at Southampton University. Among other awards was a prize from the Institute of Mechanical Engineers, given to K. Lane for his results in the Higher National Certificate.

Mr. F. T. West, principal of Southampton Technical College, presented the awards, and other speakers included Mr. T. Gilbertson (Folland director and general manager).

Owen Group's Glasgow Offices

SOME 100 guests recently attended an informal function to mark the opening of the new Glasgow offices of the Owen Organization at 11, Royal Crescent, Sauchiehall Street. In welcoming the visitors, Mr. A. G. B. Owen (chairman of the group) said that the new representation in Glasgow would provide an "on the spot" service of many types of industrial equipment.

Owen companies represented at the new offices are: Rubery, Owen and Co., Ltd., Darlaston; Rubery Owen (Warrington), Ltd.; Motor Panels (Coventry), Ltd.; E. Camelinat and Co., Ltd., Birmingham; C. and I. Hill, Ltd., Willenhall; Nuts and Bolts (Darlaston), Ltd.; Electro-Hydraulics, Ltd., Warrington; and Conveyancer Fork Trucks, Ltd., Warrington.

Vickers Appointments

LAST week we gave details of re-appointments of Vickers-Armstrongs executives. Here are four more portraits of those concerned: (Right), Maj. Gen. C. A. L. Dunphie, managing director of the engineering and shipbuilding division, now controlling the aircraft division during Maj. Kilner's absence through illness; (below, l. to r.) Mr. R. P. H. Yapp, a director appointed assistant to the managing director; Mr. T. Gammon, now deputy general manager, aircraft division; and Mr. R. Edmonds, superintendent, Weybridge.

IN BRIEF

FROM Dowty Equipment, Ltd., comes a photograph of a veritable mountain of parcels of clothing, etc., contributed by employees in response to the flood-relief appeals. Other news we have received suggests that very many firms in the aircraft industry have given practical help of this kind.

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The R.F.D. Co., Ltd., Godalming, Surrey, states that repair and maintenance instructions for its life-saving jackets Types 45 47 and 50c are available free of charge on application.

* * *

Mr. E. B. M. Grubb, general manager of D. H. Bonnella and Son, Ltd., makers of aeronautical electrical and other equipment, has been appointed a director of the firm.

* * *

A recent addendum to the "Flexelite" flexible-tank manual (Marston Excelsior, Ltd., Fordhouses, Wolverhampton), deals with the greatly improved method of tank attachment now provided by the patented controlled-compression fitting.

* * *

The annual report of H. M. Hobson, Ltd., shows that profit for the year ended September 30th, 1952, was £180,743; deductions for taxation reduced this to a net figure of £67,983. Group profits, with Integral, Ltd., were £191,029 (£72,662 net). The annual general meeting takes place in London on February 27th.

* * *

Some 170 people attended the first staff dinner, dance and cabaret held by Western Manufacturing (Reading), Ltd., which took place in Reading on January 30th. The chairman, Mr. S. R. Hogg, was amusingly introduced as the "company surgeon" by Mr. F. V. Waller (managing director); Mr. Scott Warner, on behalf of the outside guests, thanked the company for their invitation; and Mr. A. Deacon similarly expressed gratitude on behalf of the staff.

* * *

Dunlop have sent a subscription of 25 guineas to the Helicopter Association of Great Britain.

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Mr. R. L. Packer has taken up his duties as London branch manager of British Insulated Callender's Cables, Ltd., in succession to Mr. F. Samuel, who is retiring on March 8th, 1953.

* * *

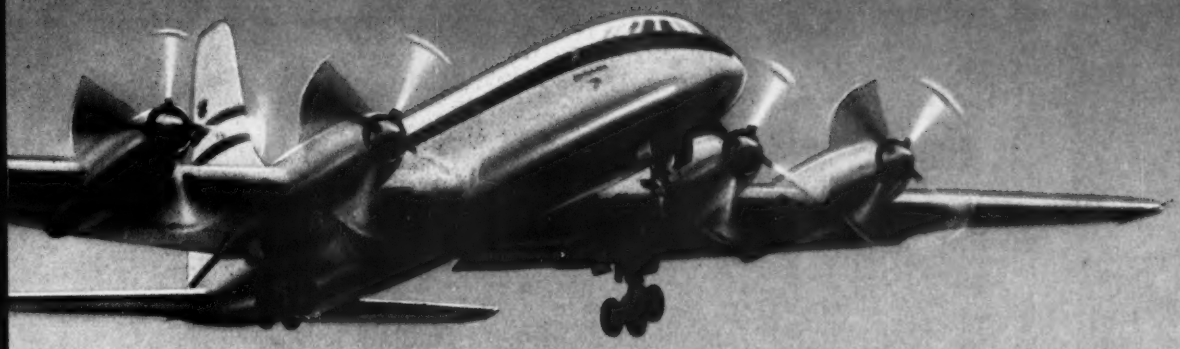
The first visitor to this country under the Federation of British Industries' overseas scholarship scheme is Mr. L. S. Srinath, from India. He is here for a two-year study of aeronautical engineering, the first six months of which he will spend in the Brough works of Blackburn and General Aircraft, Ltd.

* * *

Among British Standards recently issued are No. B.S.1905/1952, for heavy-duty lubricating oils as used in highly rated C.I. engines, and No. B.S.1942/1952, for aluminium filler alloys for brazing (this is complementary to B.S.1723 and B.S.1845). Both publications are available, at 7s 6d and 2s respectively, from the B.S.I. sales department at 24 Victoria Street, London, S.W.1.

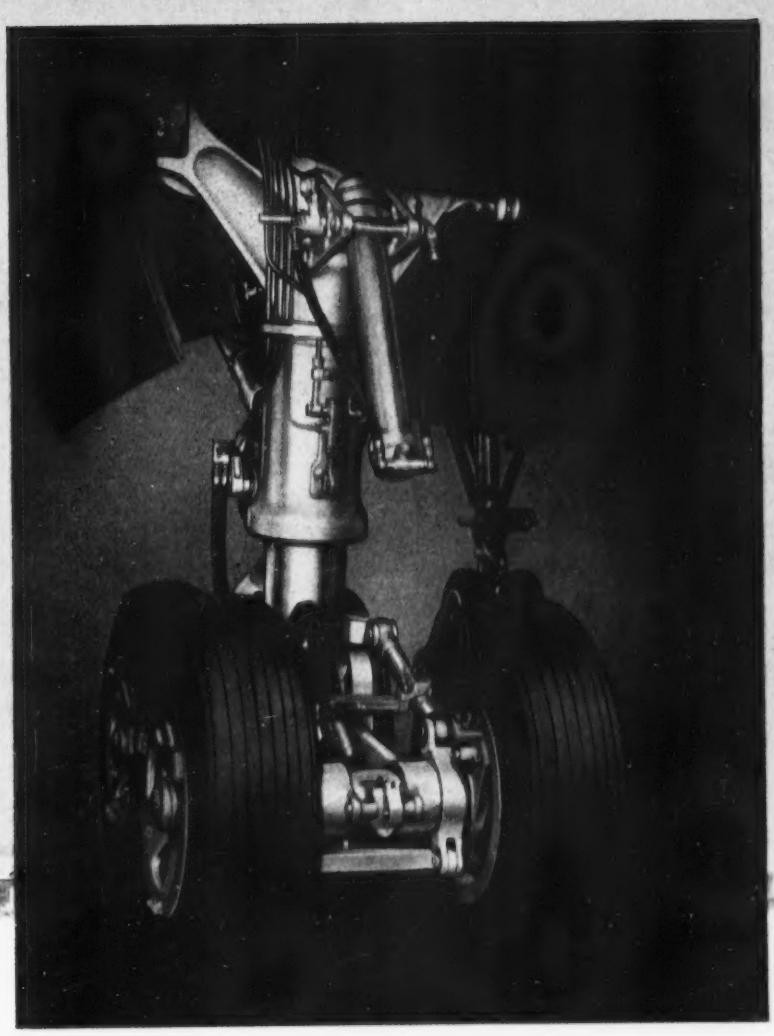
* * *

Increasing demands for the aircraft products of the Palmer Tyre, Ltd., have necessitated the establishment of two separate divisions within the company's aero sales department. Both will be located at Penfold Street, Edgware Road, London, N.W.8, and will be known as the general aircraft division and the flexible pipes division; Mr. H. D. Burke and Mr. A. T. Laws will be the respective managers.



The Bristol Britannia is fitted with the 4,000 p.s.i. hydraulic system, a development pioneered by British Messier.

The system includes four Messier 4,000 p.s.i. hydraulic pumps, and equipment for the rapid retraction of the landing gear, steering the nose wheel and operating the surface control locks.



BRITISH MESSIER

Landing Gear

BRITISH MESSIER LIMITED · GLOUCESTER

R/BM 002

An aircraft carrier at anchor in the Solent being supplied with jet fuel from an Esso refuelling vessel. Esso has the privilege of supplying high-grade aviation fuels and lubricants to the Royal Navy.

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CIVIL AVIATION

ATLANTIC FREIGHT APPLICATION APPROVED

IT was announced by the M.C.A. last Friday that the Minister had approved applications by Airwork, Ltd., to operate scheduled all-freight services between London and Canada and the United States for a period of ten years. The announcement contained the usual proviso that approval was "subject to certain conditions being satisfied." Airwork's applications, made some months ago, mentioned an initial frequency of two services weekly on both the New York and Montreal routes, using Yorks and Tudors (although the company has also referred to the possible employment of Britannia Freighters at a later date). No further information is available as to the proposed date of starting the services or the type of aircraft to be operated. Hunting Air Transport, Ltd., also submitted applications to operate all-freight services on the same routes, using American aircraft (DC-4s, DC-6As and/or Super Constellations), but no decision has been announced in this case.

Although B.O.A.C. has already announced its intention of buying five Britannia Freighters, aircraft which can obviously be used to advantage on the North Atlantic route, the Corporation has not yet applied to run any new all-freight services. It will be remembered that when the Government's "new deal for the independents" was announced last July, both B.O.A.C. and B.E.A. undertook to keep their freighting activities within their existing network during the following twelve months. However, a spokesman stated on Monday that "the Corporation regards the carriage of freight by air as part of its statutory obligations, and intends, on or after July 15th, to make application for formal licence [to operate North Atlantic freight services]. . . . Notification of this intention has already been given to the M.C.A. . . ." The statement added that "the economy of passenger services would be severely affected by any diminution of the Corporation's ability to attract the carriage of freight."

There is little doubt that foreign airlines will make a determined effort to increase their Atlantic freight traffic in the near future; in the circumstances, the Minister may find it difficult to decide upon the degree of competition between the British carriers which can economically be permitted.

The following internal services to the Channel Islands have also been approved by the Minister of Civil Aviation :—Bristol—Jersey and/or Guernsey : Morton Air Services, Ltd., for seven years; Liverpool—Cardiff and/or Bristol—Guernsey and/or Jersey : Cambrian Air Services, Ltd., for ten years; Manchester—Cardiff and/or Bristol—Guernsey and/or Jersey (winter service) : Cambrian Air Services, Ltd., for ten years; Newcastle and/or West Hartlepool—Jersey : B.K.S. Aerocharter, Ltd., for seven years; Croydon or Gatwick—Guernsey and/or Jersey (summer weekends) : Transair, Ltd., for seven years.

A SCOTTISH SERVICE WITHDRAWN

ON Friday Scottish Airlines announced "with regret" that their daily service between Prestwick, Burtonwood and London had been withdrawn "as it has not been found to be economic as a single service." The parent company, Scottish Aviation, Ltd., added that it was satisfied that "nothing more could have been done on its part or that of the Ministry of Civil Aviation to render possible the continuation of the services. . . ."

Six weekly return services have been operated on this route by Scottish Airlines, using DC-3s, since June, 1951; by the end of 1952 27,192 passengers had been carried. The scheduled time of arrival at Northolt from Glasgow and Burtonwood was 1100 hr and the return service did not leave until 1815 hr, which meant that the aircraft was normally kept on the ground for over seven hours during the day.

I.A.T.A. FREIGHT CONFERENCE

THANKS to the efficient rate-making machinery provided by the International Air Transport Association, no unseemly price-wars are waged on the world's airways, and the small-to-medium airline stands a reasonable chance of survival. Conversely, any attempt by one company to maintain an artificially high level of fares and rates is almost certain to be defeated when the airlines join conference to determine the standard tariff for a given region. Whatever its shortcomings, this system of compromise produced the "tourist" fares which gave such a fillip to transatlantic passenger travel and now promise to have a comparable effect in Europe.

On Monday a new I.A.T.A. conference began in New York, where traffic representatives of the member-airlines are discussing the possible scale of reductions in North Atlantic freight charges. A reduction of no less than 45 per cent in rates for over 3,000 different commodities has already been advocated by Pan American World Airways. Explaining the philosophy behind this proposal, Mr. Wallis Lipscomb, vice-president (traffic and sales), stated that it would enable air cargo in a wide variety of items to under-bid surface costs in the Atlantic trade. He added : "If international air cargo is to play its part in stimulating the growth of two-way trade, we must break away in the Atlantic as we have in Latin America from an air cargo rate-structure geared to small shipment."

THE CORPORATION'S OCTOBER FIGURES

IN October, 1952, B.E.A. flew 31,303,000 passenger-miles and carried 115,000 passengers, increases of 21 and 27 per cent respectively when compared with October, 1951. Capacity ton-miles increased by 26 per cent to 5,977,000, and load ton-miles by 19.5 per cent to 3,717,000. Tons of freight and mail carried totalled 1,515 and 537 respectively.

During the four-week period September 28th to October 25th, B.O.A.C. carried 21,000 passengers, 518 tons of freight and 227 tons of mail; 72,962,000 passenger-miles were flown. Ton-miles available totalled 18,059,000 and ton-miles flown 10,928,000, resulting in an overall load factor of 60.5

More than twice as many passengers as in October, 1951, and nearly twice as much freight, were carried on the scheduled services operated by independent airlines in association with the Corporations. Their figures included : 171,000 aircraft miles flown; 4,000 passengers carried; 1,415 tons of freight carried; 2,171,000 passenger-miles, and overall load factor 71.3 per cent.

S.A.S. 1952 PROFIT

DURING the fiscal year from October 1st, 1951, to September 30th, 1952, Scandinavian Airlines System report a net profit of £107,723, compared with £175,046 for 1950-51. Revenue totalled £15,543,973, and operating expenses £14,126,495, resulting in a gross profit of £1,417,478. Revenue ton-kilometres flown during the year amounted to some 82 million, an increase of 17.4 per cent over last year's total; 568,292 passengers, 8,501,494 kgs of freight, and 2,951,210 kgs of mail were flown—increase of 18, 11 and 26 per cent respectively.

COMPLAINTS ABOUT LYMPNE

HAVING paid some £32,000 to the M.C.A. over the past two years in the form of landing-fees incurred at Lympne Airport, Silver City Airways have been looking forward with some impatience to long-promised improvements in the conditions of the airfield. Last year Lympne became waterlogged for five weeks and the airline was forced to continue its operations from Southend and Blackbushe, at an estimated loss of £500 per day. Last Friday pilots reported that braking action was nil and the ground was again too soft for safe operation; in fact, one aircraft became bogged down. On the following day services were flown from Southend and on Sunday and Monday from Blackbushe.

In replying to the allegations concerning the airfield surface, the M.C.A. have stated that the airfield is not closed; that its condition is considerably better than during the same period last year and that drainage is proving "quite satisfactory." Lack of interest in the future of Lympne, which has proved itself as a money-earning airport, seems to be the real cause of this unsatisfactory state of affairs. Silver City have expressed willingness to buy the airport over a period of years, but its ownership has been the subject of constant changes in official policy. Finally, last autumn, Lympne was offered to the Folkestone Council, whose decision is still awaited.

SOVIET AIRLINE ANNIVERSARY

THROUGHOUT last week the Soviet radio network and Press devoted much time and space to the publicizing of the 30th anniversary of the setting-up of Soviet civil airlines. On February 11th, eve of the anniversary, Lt.-Gen. E. Beletsky contributed to the *Krasnaya Zvezda* ("Red Star") a lengthy article on the development of Soviet civil aviation, in which he stated that the "freight carried by the civilian air fleet in 1952 was 9.2 times as large as in 1940, and the aggregate length of air lines was 2.5 times as great."

Under the current five-year plan (1951-1955), Soviet civil airlines are to be developed further, the article continued: "The fleet of transport planes and the number of airports equipped for day and night flying is to be doubled; during those five years airborne freight is to increase not less than 100 per cent. New airlines will be launched under the plan to establish direct air communcations to the Ukraine and to the Urals and Central Asia."

Beletsky wrote that planes of the Soviet civil lines are already flying on a round-the-clock basis, carrying not only large amounts

CIVIL AVIATION . . .

of freight and passengers, but also quantities of newspapers: "*Pravda* and other national newspapers are daily flown from Moscow to Leningrad, Rostov, Baku, Tashkent, Kuibyshev, Kiev, Novosibirsk, Khabarovsk and other major cities. Several millions of copies of newspapers and magazines are daily carried by national and local air lines."

Soviet international services, it was stated, fly to Poland, Czechoslovakia, Hungary, Rumania, Bulgaria, Albania, Eastern Germany, Mongolia, Finland, Austria and Afghanistan; the route between Russia and the Chinese People's Republic is served by aircraft of the Sino-Soviet Airline, which also operates a number of joint lines in the Far East.

Other duties of the Soviet civil air force, said the article, include the airlifting of cargoes and machinery to the so-called "Communist construction schemes," such as canals, power stations, etc., crop-spraying and forest-spraying. One novel application for aircraft was the sowing of a special kind of grass along the future Turkmen Canal, in order to anchor the shifting sands there.

WORLD AIRLINE RECORD

THE work of compiling an overall source of reference on practically any subject is an unusually thankless task, as many authors know from bitter experience. Months of research are taken for granted by an ungrateful public, while reviewers show an uncanny talent for spotting the smallest of errors. Setting aside this latter temptation, we welcome the latest volume of Mr. Roy R. Roadcap's *World Airline Record*, whose 400 pages contain historical, administrative, financial and operational data for 240 scheduled airlines. This edition includes 138 more airlines than its predecessor, and comes much nearer to meeting the claim implicit in the title.

Airlines are reviewed under the separate headings of Africa, Asia, Australasia, Europe, North America and South America; in most cases the data mentioned above are supplemented by route-maps, and there are 22 photographic illustrations. Some of the smaller airlines have been omitted, and it would be untrue to describe the book as complete in every detail; nevertheless, the fact remains that *World Airline Record* is the only work of its kind. Providing a detailed description of the world's air-transport industry at an important evolutionary stage, it promises to become an indispensable part of the basic aviation library.

One of the main obstacles in compiling a book of this kind is lack of co-operation on the part of many airlines. John Stroud, whose work as an air-transport historian is well-known, recently wrote to us that "Seekers after airline facts are often regarded as spies. I received poor treatment in Athens when endeavouring to compile a fleet list of T.A.E. and I have on another occasion received answers from only three U.S. local-service carriers after writing to 25 of them . . ." No less an authority than I.C.A.O. suffers from the same problem; last year's report on the activities of the Organization noted that "there were still eighteen countries with international airlines that had never filed any of the required reporting forms."

"*World Airline Record.*" *Published by Roy R. Roadcap and Associates, 327, South La Salle Street, Chicago 3, Illinois, U.S.A. Price £4 10s.*

AMERICA'S AIRLINES IN 1952

WELL over half the 44 million passengers who used the world's scheduled air services last year flew with American domestic or international companies, according to the U.S. Air Transport Association's review of 1952. The review says that American airlines carried 27 m passengers, 9.7 per cent more than in 1951, and the total of 16,600 m revenue passenger-miles represented an increase of 17.3 per cent. Mail ton-miles increased by 7 per cent and cargo ton-miles by only 2.1 per cent to 97 m and 400 m respectively.

Total revenue earned by the American airlines went up by about 10 per cent to £370 m, but profits were reduced by a 20 per cent rise in operating costs. Practically two-thirds of the total earnings went to the domestic lines, who reported revenue increases of 16.7 per cent from passenger tickets, 20.5 per cent from freight and 4.5 per cent from express; mail earnings, however, dropped by 2.1 per cent. A 10–15 per cent increase in domestic passenger traffic is predicted for 1953.

RAILWAYS FOLLOW B.E.A. LEAD

GENERALLY accepted as an attempt to answer the competition of air and road transport, special cheap return fares for the London-Glasgow and London-Edinburgh routes were announced last week by British Railways. The cost will be £3 10s for either a weekly or fortnightly return ticket, compared with the old three-monthly third-class return fares of £5 17s 4d to Glasgow and £5 14s 8d to Edinburgh. Return fares by road, air (B.E.A. winter rate) and first-class train are £3, £8 and £8 12s respectively, to either city.

DC-7 PROGRESS

FROM California comes the news that the wing and fuselage of the first Douglas DC-7—the DC-6 development—were recently joined at the company's Santa Monica plant, and installation of engines and undercarriage was started. The transport is due to fly at about the end of March, and is estimated to have a cruising speed of 360 m.p.h.

Titanium is said to be used "in large quantities" in the new machine and, in addition to the value of its high-strength properties at high temperatures, to result in a weight-saving of some 200 lb per aircraft.

Orders for DC-7s have been received to date from American Airlines (25), United Airlines (25), Delta Airlines (4) and National Airlines (4).

COMET ROUTE TO TOKYO

APRIL 3rd is announced as the date scheduled for the introduction of B.O.A.C. Comet services from London to Tokyo. The initial frequency of one return service weekly will be doubled from April 13th and the frequency of the present Argonaut services (at present there are four weekly in each direction) will be reduced correspondingly. The Tokyo service begins less than a year after the inauguration of Comet services to Johannesburg in May 1952. Since then, regular Comet services have also been introduced on the Ceylon and Singapore routes.

On the long London-Tokyo route (approximately 10,000 miles) the Comet's high speed is seen to better advantage than on the other services. Flying *via* Rome, Beirut (or Cairo), Bahrein, Karachi, Delhi, Calcutta, Rangoon, Bangkok, Manila and Okinawa, Comets will reach Tokyo 33 hr 15 mins after leaving London; the fact that flying time will be only 26 hr 15 min emphasizes the short average time spent on refuelling stops.

Elapsed time for the present Argonaut service, with night-stops at Rangoon and Hongkong, is 86 hr and the flying time is 45 hr 15 min. This does not, of course, represent the best time possible on the route with a piston-engined airliner. Air France operates a weekly Constellation 749 service from Paris to Tokyo which

COLOMBO, Ceylon, the setting for this study of a Comet I refuelling, is the terminal of the third B.O.A.C. jet route to be opened since regular services began last May. Plans for a fourth—to Tokyo—are outlined in the paragraph above. Journey-times from London are: Johannesburg, 23 hr 40 min; Colombo, 21 hr 35 min; Singapore, 27 hr 25 min; Tokyo, 33 hr 15 min. Pressure refuelling, enabling the Comet to take on 7,000 gallons of kerosine in 20 min, helps to cut down the time spent at intermediate points.

LE PREMIER VICOMTE: Pictured last week at the end of the Weybridge assembly-line of Vickers-Armstrongs, Ltd., the first Viscount 708 for Air France is now almost ready for flight trials. Six of the French airline's order for 12 Viscounts are at present under construction.

completes the journey in 42 hr. Only three 1 hr 15 min refuelling stops are made at Beirut, Karachi and Saigon; although it spends over 38 out of the 42 hr in the air, this service is described as of luxury standard, since the Constellation carries only 34 passengers in reclining seats. Constellation 749s are also used by K.L.M. for two weekly services from Amsterdam to Tokyo with seven landings en route, and the S.A.S. services from Stockholm (twice weekly) to the Japanese capital are operated with DC-6s.

The Air France schedule, which is the fastest service between Europe and Tokyo offered by any of B.O.A.C.'s competitors, obviously approaches the ultimate speed possible with piston-engined airliners flying between the two points *via* India. S.A.S. hope to cut 16 hr off their present Stockholm-Tokyo time by operating *via* Greenland and the Aleutians. The main disadvantage of the northern route, however, is the lack of intermediate traffic stops.

TRANSATLANTIC FREIGHT PROSPECTS

AN increase of 25 per cent in the amount of freight carried by air across the North Atlantic in 1952 (traffic is estimated as 46 million ton/miles for all carriers) is forecast for 1953 by Mr. R. A. Norden, president of Seaboard and Western Airlines. Among the factors responsible for this increase, said Mr. Norden, would be the growing capacity of Western European nations to meet the demand of the American dollar market; he also suggested that with the levelling-off of some U.S. defence production there would be an opportunity for European buyers to import more goods to Europe. The American executive described West Germany as holding top position among European importer/exporter nations of air freight and suggested that Germany's strengthened financial position will enable the country to make further use of air freight during the coming year.

WINGED WORDS

YESTERDAY, February 19th, Mr. John Profumo, M.P., Parliamentary Secretary to the M.C.A., was due to open the new Civil Aviation Communications Centre at Croydon. Since the war, the British portion of I.C.A.O.'s aeronautical fixed telecommunications network, comprising teleprinter, radio-teletype and hand-operated W/T. circuits for relaying both administrative and traffic messages, has inevitably grown up in a piecemeal and unsatisfactory fashion, resulting—mainly through the use of obsolete equipment—in slow transmission of messages and much duplication of effort. In 1949 Treasury approval was obtained for the construction of a completely new centre; and, after some deliberation, a disused factory on Croydon Airport was chosen as site. This choice may seem surprising, but the easier labour and staff accommodation conditions, and the ready availability of G.P.O. facilities in the area, were among the reasons for the decision.

With the opportunity to start, as it were, from scratch, every effort was made to plan a really modern installation capable of considerable development later on. Messrs. A. B. Gilbert and G. E. Graham, of the M.C.A., were largely responsible for the successful equipment layout that has been achieved, and Mr. Graham and Mr. S. R. Brown are now in charge of the unit, which has in fact already been in operation for some five or six weeks. A total staff of about 150 men and women are employed, mostly on shift work. Approximately 1,000 messages per hour can at present be handled during peak periods, but provision has been made for trebling the facilities. A close and satisfactory liaison has been established between the M.C.A. personnel and the G.P.O. technicians who maintain the equipment and track down outside faults.

The type and layout of apparatus installed at the Croydon centre has been chosen with four criteria in mind: firstly, reduction of transmission time by use of automatic teleprinting devices operating at 66 words per minute; secondly, elimination of delay in retransmission, by utilization of a new type of teletape on which messages are recorded not only by partial perforations, but also in print (the contents and destination are thus immediately obvious to the operator, who can at once feed the tape into an automatic transmitter); thirdly, reduction in the number of retransmissions, which is being effected by reducing the number of other communication centres to a minimum; and, fourthly, reduction of in-station handling time. This last aim has been achieved by a new variation on an old theme: message tapes are transported to various points in the operating room by attaching them to plugs of rubber which are sucked with astounding speed through transparent plastic tubes.

With these points in mind, the sequence of operations can now be followed. Incoming messages (aircraft flight movements, met. reports, emergency calls, etc.) are recorded on tape by racks of "printing perforators." If there is an emergency message, attention is called to it by a red lamp. When a reel of tape is nearly exhausted, a green light flashes on. The tape-messages are then marked with routing instructions, and sent to the "circulator"—who takes them to special slotted storage racks on the transmitters; or to the duplicating centre, if the messages have more than one destination; or, if the required routing is not self-evident, to a "router's" position. In the latter two cases, the messages eventually finish up at the transmitters *via* the circulator. All transmissions are then sent out automatically.

Many other facilities and safety measures have also been provided. These include special fault-finding systems, a method of message-priority control, automatic clocks, and stand-by power supply. If the normal transmission circuits break down, messages can be routed through Cable and Wireless, Ltd., to overseas destinations, and through Telex to points within the United Kingdom.

The original factory was fitted with air-conditioning, which has been retained—with advantage to personnel and equipment alike—and working conditions seem excellent, the whole centre giving an impression of quiet efficiency.

BREVITIES

FLYING between Entebbe and Livingstone on February 8th, a Comet under the command of Capt. J. Andrew completed B.O.A.C.'s 10,000th hour of Comet flight time. Scheduled services, which have carried some 15,000 revenue passengers since May 2nd, were responsible for 60 per cent of this total.

* * *

With the acquisition of two 61-seat DC-4s, Japan Air Lines now have a fleet of six of these aircraft. A Japanese source reports that the company has recently bought up three other airlines, the Japanese Helicopter Transport Service, the Kyoto Air Lines and Tokyo Air Lines.

* * *

Australian National Airways have announced the retirement of Mr. John Stubbs, engineering advisor to the managing director and a pioneer of Australian civil aviation. Mr. Stubbs has taken up a new appointment with the British Aviation Insurance Group as consultant and surveyor for Australia.

* * *

Believing that London hotel accommodation will be insufficient at the time of the coronation, K.L.M. are making plans to take over hotel space for sightseers at The Hague, Scheveningen, Lisse, Noordwijk and other towns. Each day special flights will take visitors from Schiphol to London and back.

* * *

Within the last few days, P.A.W.A. expected to complete their 25,000th flight between New York and San Juan since the airline established a direct service on July 1st, 1946. Over this period the frequency of service has been increased from 14 to 80 weekly and the present return fare of $128 is $2 less than the original single fare. The first international "tourist" services to be offered by any American airline operator were introduced on this route in 1948.

* * *

Containing ingeniously condensed information, a second edition of its admirable guide to over 4,000 hotels in the British Isles has been issued by the British Travel and Holidays Association. Although prepared primarily for overseas circulation, the guide is available (at 2s 6d, from the B.T.H.A. at 64-65, St. James's Street, London, S.W.1) in limited numbers here.

CIVIL AVIATION . . .

Combined air-sea tours based on New York of seven West Indian Islands and Caracas on the Venezuelan mainland are now being offered by B.O.A.C. in conjunction with Bull Lines. The traveller sails from New York to San Juan, Puerto Rico, is flown by B.W.I.A. to St. Kitts, Antigua, Barbados, Trinidad, Caracas, Jamaica and Nassau returning to New York by B.O.A.C. Tickets for the tour cost $388.8 (£136).

* * *

The first of twelve Breguet 763s ordered by Air France is to be delivered at the end of February and will shortly be employed on regular passenger services. The type was recently awarded its C. of A. following the successful completion of recent endurance tests occupying 133 days, which were carried out by Air France crews. The aircraft flew on 83 of those days, averaging nine hours daily utilization and carrying a total of 661 tons payload.

* * *

The Smiths S.E.P. 2 automatic pilot, the successor to the well-known S.E.P. 1, was carried in the Viscount 700 prototype which left Wisley for Canada last Friday, enabling early experience to be gained of this installation, which will be fitted to the Viscount 800, Britannia and Comet 2. The complete S.E.P. 2 system, including its automatic approach coupling to I.L.S., was adjusted and matched to the Viscount's flying characteristics in less than seven hours automatic pilot flying time.

QANTAS recently presented awards for long service to 176 employees who have been with the airline ten years or more. In the London office at Airways Terminal, Capt. L. R. Ambrose, London manager and himself a recipient, is seen presenting a 15-year award to Mr. D. Maitland (left) sales superintendent for Europe.

BRITISH AIRPORT STATISTICS FOR 1952

NEWLY published M.C.A. figures for traffic at U.K. airports last year show that just under three million passengers were handled, of whom over half used London Airport and Northolt. Although more passenger movements were recorded at both airports than in the previous year, the number of passengers handled at Northolt increased by only 3 per cent to 373,000. At London Airport the increase was 8 per cent but this was far less impressive than in recent years, as the following figures (showing passenger totals for the past four years) indicate—1949, 395,000; 1950, 523,000; 1951, 796,000; 1952, 861,000. Percentage increases in passenger traffic were considerably higher at many of the airports outside the London area including Prestwick, (31 per cent); Manchester, (40 per cent); Glasgow, (12 per cent); Belfast, (10 per cent); Isle of Man, (24 per cent); Jersey, (28 per cent); and Guernsey (27 per cent). Freight handled at London Airport amounted to 15,300 short tons—6 per cent more than the previous year's total and three-fifths of the total freight traffic in the London area. The overall freight total was 3,000 short tons less than the 1951 figure, this decline being attributed to reduced traffic on Silver City Airways' Lympne-Le Touquet vehicle ferry, (due in turn to the effects of the currency allowance). The total number of landings and take-offs at U.K. airports by civil transport aircraft was 195,400—an increase of only 4.5 per cent over the 1951 total.

Traffic figures for the main U.K. airports during last year, with 1951 statistics for comparison, are set out in the table below. All but Guernsey and Jersey are Customs airports. The main figures for airports not mentioned below are contained in the right-hand table. The overall total of mail set down and picked up at British airports (not shown in the table) was 13,506 tons, compared with 13,060 in 1951; of this total, the London-area airports handled 7,759 tons.

Airport	Total movements	Transport movements	Passengers handled	Freight (short tons)	Mail (short tons)
Blackbush	26,213	2,051	53,931	730	6
Bovingdon	31,258	1,919	53,975	140	18
Croydon	17,099	4,599	8,222	1,547	176
Gatwick	11,333	331	1,845	—	—
Stansted	9,022	283	10,901	15	—
Aberdeen (Dyce)	16,273	2,402	20,776	153	150
Benbecula	1,319	1,267	9,810	20	27
Birmingham (Elmdon)	14,336	4,208	46,489	237	3
Blackpool (Squires Gate)	30,781	2,558	14,001	14	—
Bristol (Lulsgate Bottom)	249	—	—	—	—
Bristol (Whitchurch)	» 8,888	1,428	12,396	69	—
Cardiff (Pengam Moors)	28,016	2,020	6,880	—	—
Cardiff (Rhoose)	349	334	3,352	6	—
Haymills	160	158	201	—	—
Hurn	15,058	634	5,440	89	58
Inverness	1,845	1,785	9,456	18	84
Islay (Port Ellen)	1,236	1,109	5,194	34	31
Kirkwall	2,854	2,550	21,707	111	104
Lands End (St. Just)	5,806	4,059	20,537	22	9
Leeds (Yeadon)	9,259	461	1,793	1	—
Luton	6,649	10	108	1	—
Lympne	11,481	5,452	27,613	9,964	—
Machrihanish	1,407	1,393	7,162	30	22
Scilly Isles (St. Marys)	4,280	4,070	20,573	22	9
Southampton (Eastleigh)	19,900	4,511	59,643	1,331	3
Southampton Water	130	125	3,337	2	5
Southend (Rochford)	6,480	179	2,188	167	—
Stornoway	1,189	954	10,142	71	56
Sumburgh	709	620	7,719	56	85
Tiree	1,075	959	3,768	9	6
Weston-super-Mare	1,968	317	999	—	—
Wick	2,936	2,717	10,659	8	53
Alderney	—	3,089	14,128	110	—
Guernsey	—	13,695	116,406	594	—
Jersey	—	22,364	251,846	591	171

Airport	Aircraft Movements: Total 1952	Total 1951	Total % change	Air transport only 1952	Air transport only 1951	Air transport only % change	Passengers Handled: Terminal 1952	Total 1952	Total 1951	Total % change	Freight Traffic: Short tons 1952	1951	% change
M.C.A. and other U.K. airfields	513,663	499,159	+2.9	195,431	186,991	+4.5	2,775,981	2,970,360	2,629,283	+13.0	44,026	48,206	−8.7
All London-area airfields	198,705	176,974	+12.3	89,026	86,814	+2.5	1,734,197	1,762,646	1,619,025	+8.9	25,985	26,039	−0.2
London and Northolt:	103,780	102,671	+1.1	79,843	78,573	+1.6	1,605,701	1,633,772	1,545,819	+5.7	23,553	22,664	+3.9
London	50,859	49,341	+3.1	35,688	34,921	+2.2	838,676	860,760	796,092	+8.1	15,330	14,457	+6.0
Northolt	52,921	53,330	−0.8	44,155	43,652	+1.2	767,025	773,012	749,727	+3.1	8,223	8,207	+0.2
Belfast (Nutts Corner)	8,963	9,035	−0.8	8,393	8,196	+2.4	147,527	147,601	134,029	+10.1	608	1,408	−56.8
Edinburgh (Turnhouse)*	14,617	15,768	−7.3	2,266	1,225	+85.0	28,119	30,995	15,885	+95.1	30	18	+66.7
Glasgow (Renfrew)	21,666	20,858	+3.9	11,237	10,846	+3.6	156,615	156,916	139,599	+12.4	493	496	−0.6
Isle of Man (Ronaldsway)	11,589	9,819	+18.0	10,771	8,613	+25.1	115,032	126,916	102,372	+24.0	389	355	+9.6
Liverpool (Speke)	20,267	19,507	+3.9	5,843	6,241	−6.4	81,853	83,755	83,942	−0.2	734	1,457	−49.6
Manchester (Ringway)	21,908	21,093	+3.9	12,648	10,090	+25.4	144,594	161,156	115,246	+39.8	2,684	3,070	−12.6
Prestwick	21,315	12,747	+67.2	8,967	7,454	+20.3	172,212	168,432	128,111	+31.5	669	570	+17.4
Channel Islands:	—	—	—	39,148	35,474	+10.4	359,014	382,380	302,234	+26.5	1,295	1,807	−28.3
Guernsey	—	—	—	13,695	12,505	+9.5	99,589	116,406	91,987	+26.5	594	686	−13.4
Jersey	—	—	—	22,364	19,426	+15.1	245,419	251,846	196,592	+28.1	591	640	−7.7

*Military aircraft movements at Edinburgh were not reported after August 31st, 1952.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

"Flight" photograph

FOR STRIKE DUTIES: Service clearance for Westland Wyvern S.4s (Armstrong Siddeley Python) having recently been granted, a Naval squadron is already preparing to re-equip with them. Squadron aircraft are to have additional small fins on the tailplane tips.

C.A.S. At Buckingham Palace

ON Thursday of last week the Queen received Air Chief Marshal Sir William Dickson on his appointment as Chief of the Air Staff, and invested him with the insignia of Knight Grand Cross of the Order of the Bath.

High-command Promotions

THE Air Ministry has announced that, with effect from January 28th last, Air Marshal Sir John Whitworth Jones, K.C.B., C.B.E., and Air Marshal Sir Robert M. Foster, K.C.B., are both to be Air Chief Marshals.

Three promotions to the rank of Air Marshal, announced at the same time, are those of Acting Air Marshal H. T. Lydford, C.B., C.B.E., A.F.C., Act. Air Marshal A. C. Sanderson, K.B.E., C.B., D.F.C. and Act. Air Marshal L. F. Pendred, C.B., M.B.E., D.F.C., all with effect from January 1st.

No. 84 Squadron Leaves F.E.A.F.

ON the occasion of No. 84 Squadron's leaving the Far East Air Force, a farewell parade was held at Tengah, the station from which the unit has been flying its Bristol Brigands.

The A.O.C-in-C. F.E.A.F., Air Marshal A. C. Sanderson, took the salute and afterwards addressed the squadron, which was drawn up in the centre of the parade under its C.O., S/L. I. L. Johnson.

The squadron, he said, had a distinguished history. In its two-and-a-half years of active service in Malaya, the squadron aircrew had flown 2,038 operational sorties and dropped 1,883 tons of bombs.

Air Marshal Sanderson thanked the squadron for the way in which it had "set the pace and kept alive the wonderful espirit-de-corps which had always been associated with the squadron."

Filling the Gaps

LAST week-end Transport Command put aside nearly all other commitments in order to collect several million sandbags to be used to fill the gaps in our sea defences. Starting at dawn on Friday, 14 Hastings and six Valettas kept up a shuttle service to and from the Continent.

Some 350,000 bags, made available by the Swiss, were collected from Berne, 100,000 from Oslo and one-and-a-quarter million from Milan. A load for a Hastings amounted to 20,000 sandbags and for a Valetta 10,500. To help in distribution the bags were delivered to Manston, Kent, and Waterbeach, Cambridgeshire.

The Italian Air Force lent three Dakotas to help in transporting the bags quickly; Belgium sent 500,000 by sea; and Portugal flew 80,000 bags to Britain in its own aircraft.

Three-all At Twickenham

A FAIR result to a cold and muddy game were the three points apiece which the Navy and R.A.F. XVs gained in the opening match of the Inter-Services Championship at Twickenham last Saturday. In fact, the R.A.F.'s try, which came at the end of the game after a diagonal run by Channer at stand-off, was placed near the posts, and thus there was a good chance for them to win at the eleventh hour. Unfortunately, however, Beatson's kick failed, as had several others during the game.

The R.A.F. opened strongly, but at half-time there was still no score, owing to good defence on both sides. In the second half, however, from a scrum near the R.A.F. line, the Navy quickly took the lead when back-row forward Ridd dived over for the touch-down. On the whole the Navy forwards seemed to have a slight edge over their opponents in most phases of the game. Of the outsides those of the R.A.F were definitely the more purposeful.

Outstanding in the R.A.F. team were Tindall and Channer, and among the forwards Yarranton (the captain) and Collingridge. Both the R.A.F. and the Navy had lost one forward to the England side which drew with Ireland on the same afternoon. They were, respectively, Stirling and Wilkins. The teams were :—

Royal Air Force.—L. A/C. A. J. Priday (St. Athan); F/O. G. Rowlands (St. Athan), F/O. T. R. Beatson (Wroughton), F/O. I. D. Farmer-Wright (West Malling), F/O. V. R. Tindall (Central Medical Establishment); F/O. M. R. Channer (Sverston), A/C. Lloyd-Williams (Pershore); P/O. A. J. Herbert (Kirkbirgton), F/O. P. S. Collingridge (Cranwell), P/O. J. Greenwood (Trimley Heath), F/O. G. J. A. Head (Halton), F/L. P. G. Yarranton (Air Ministry) (captain), Cpl. L. Cunningham (Innsworth), P/O. B. J. Lane (Hamble), P/O. M. Pollard (Thorney Island).

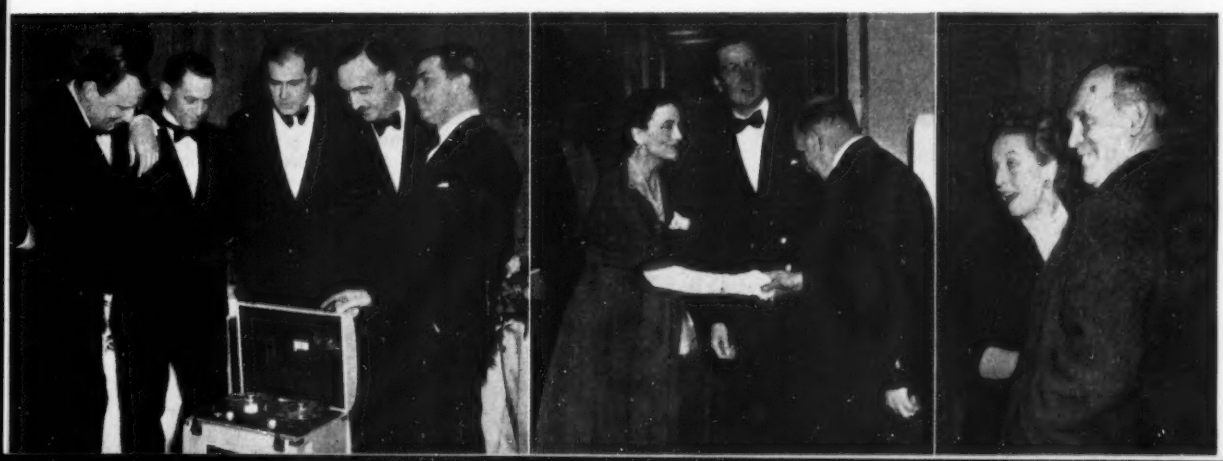
Royal Navy.—Coder A. P. Harries (H.M.S. *Victory*); Lt. R. M. Holgate, R.M. (H.M.S. *President*), Inst.-Lt. R. A. Slater (H.M.S. *St. Vincent*), Inst.-Lt. H. P. Jones (H.M.S. *St. Vincent*), Inst.-Lt. W. J. Glastonbury (H.M.S. *Alaunia*); Marine T. E. Davies (Commando School R.M.), Sub.-Lt. J. B. Wallace (H.M.S. *Dolphin*); Radio Elect. G. E. R. Ridd (H.M.S. *Tuscan*), Inst.-Lt. D. B. Vaughan (H.M.S. *Collingwood*) (captain), Lt. Cdr. (E) P. B. Sinderv (H.M.S. *Centaur*), Air Artif. J. Jenkins (H.M.S. *Hornbill*), Air Artif. A. R. Valentine (H.M.S. *Nuthatch*), Writer D. B. Main (H.M.S. *Cumberland*), Marine K. James (Commando School R.M.), Stoker W. O. Williams (H.M.S. *Alaunia*).

R.A.F. Appointments

AFTER spending the last 12 months as station commander at Manby, Lincolnshire, A. Cdre. D. L. Thomson, D.S.O., D.F.C., is to become S.A.S.O. No. 61 (Eastern) Group, Home Command The present S.A.S.O. at No. 61 Group, A. Cdre. C. W. Gore, O.B.E., has been appointed Director of Equipment (A) at the Air Ministry.

Until recently A.O.C. East Africa and Commanding Officer R.A.F. Eastleigh, A. Cdre, L. T. Parkhurst, C.B.E., has become Director of Postings at the Air Ministry in succession to A. Cdre. B. H. C.

V.C.s GATHERING: The day before the première of the film "Appointment in London" (see page 215), the surviving V.C.s of Bomber Command attended a function, at which they are seen listening to a recorded message from G/C. L. Cheshire, who was prevented by illness from attending. Left to right: W/C. R. A. B. Learoyd, S/L. L. H. Trent, W/C. H. I. Edwards, F/L. W. Reid and W/O. N. C. Jackson. In the centre the Duchess of Gloucester is being received by Air Chief Marshal Sir William F. Dickson, behind whom is Lord De L'Isle and Dudley, V.C. On the right is A. Cdre. West, V.C., and Mrs. West. A. Cdre West won his V.C. in the First World War.



SERVICE AVIATION . . .

Russell, C.B.E., who is retiring from the Service.

Another appointment is that of A. Cdre. J. M. Cohu, C.B.E., to be S.A.S.O. at No. 205 Group, M.E.A.F. To take up his new post, A. Cdre. Cohu leaves the Defence Research Policy Committee, on which he was the R.A.F. member.

Canadian D.F.C.

FOR his service in Korea, while attached for duty with the U.S.A.F., F/L. E. A. Glover has been awarded the D.F.C. His tour of duty included 50 operational sorties and he was officially credited with the destruction of three Mig-15s and the damaging of two others. F/L. Glover served during the war with No. 1 Squadron, R.A.F.

Turnhouse Commander

AT present serving as personal staff officer to Air Marshal Sir Basil Embry, C.-in-C. Fighter Command, W/C. W. G. Duncan Smith, D.S.O., D.F.C., has been appointed to command R.A.F. Station Turnhouse, Edinburgh. W/C. Smith has a Bar to his D.S.O. and two Bars to his D.F.C.

R.A.F. Chaplain-in-Chief

WITH effect from May 15th next, the Reverend A. S. Giles, O.B.E., Q.H.C., is to succeed the Reverend Canon L. Wright, C.B.E., Q.H.C., as Chaplain-in-Chief of the R.A.F. Canon Wright is retiring from the Service.

First Raters

BECAUSE the category "frigate" has ceased to be indicative of the differing capabilities of the various ships to which the name is applied, the Royal Navy is to return to the old terms of "first-raters" and "second-raters."

"First-rate escorts" will include all anti-submarine and anti-aircraft vessels with speeds of 30 knots or more, whatever their displacement.

Malayan Operations

AIR strikes in Malaya by the R.A.F. and R.A.A.F. during the month of January totalled 34, in which Lincolns, Hornets, Vampires and Sunderlands all took part. The chief targets were in the states of Selangor and Johore, in support of "food denial" operations by troops of the Cameronians and Royal West Kent Regiment.

Valettas, based on Changi and Kuala Lumpur, delivered 310,000 lb of stores to 153 dropping-zones. In addition a million and a half surrender leaflets were dropped.

On January 28th the paratroop operation at Labis, North Johore, took place, and during the month six casualties were flown out of jungle clearings by helicopters of No. 848 Squadron, R.N., and the R.A.F. Far East Helicopter Evacuation Flight.

Hack Trophy

THE annual award of the Hack Trophy to the best all-round University Air Squadron, goes for 1952 to the Queen's University Air Squadron, Belfast, with a marking of 86.9 per cent. Birmingham was second with 84.6 per cent and Manchester third with 84 per cent.

W/C. E. J. Hack presented the Trophy in 1943. The competition consists of flying tests for six selected cadet officers—one from each "year"—a written examination for these cadets, and a detailed inspection of the squadron's ground and flying training facilities, organization and records. Marks are deducted for avoidable flying accidents.

Naval Air Training in Canada

THE Royal Canadian Navy is now training a group of Royal Navy officers for duty as naval observers in H.M.C.S. *Shearwater*, the observer school near Dartmouth, Novia Scotia. The school was opened last October to absorb an overflow from Britain, resulting from increased training requirements of NATO countries. It is intended to train 32 observers a year in the Canadian school. At present there are a sub-lieutenant and nine midshipmen of the Royal Navy undergoing the course. Future courses will have a percentage of Canadian enrolment.

The first three months of the nine-month course are devoted to academic subjects, particularly mathematics and physics, and a grounding in air communications. The second three months cover basic navigation and maritime warfare, and the final phase is devoted mainly to advanced air navigation and allied subjects. Meteorology, photography, ship and aircraft recognition and armaments are some of the other subjects taught.

Flying experience is gained throughout the course in Grumman Avengers, and it is expected that almost 200 hours' flying time will be logged by each student.

MOUNTING UP: F/S. K. Murray, serving with No. 77 Squadron, R.A.A.F., who has completed no fewer than 300 operational sorties on Meteor 8s in Korea.

Several long-range cross-country exercises planned for later stages in the training will take the midshipmen to various Canadian and United States centres.

The training received in Canada comprises the initial basic observer training in general subjects. The final anti-submarine practical instruction is continued in the United Kingdom—at Eglinton, in Northern Ireland.

The Commanding Officer of the School is Lt. Cdr. (O) J. A Stokes, R.C.N. The Royal Navy has provided three observer instructors, three pilots and two Chief Aircrewmen as its share of the instructional task. Two in particular have a rich and varied naval aviation lore to offer the students. The senior instructor is Lt. Cdr. A. J. McCulloch, who has served for 27 years in the Royal Navy. He started his flying 20 years ago as a telegraphist air gunner. Another old hand is Senior Commissioned Observer Wallington, who joined in 1921 and logged his first flight six years later. He served on the staff of the Royal Navy's Air Gunner School in Yarmouth, Nova Scotia, for a while in the Second World War.

DARTMOUTH MARK II: Midshipmen of the Royal Navy receiving instruction at H.M.C.S. "Shearwater," the Canadian naval air station at Dartmouth, Nova Scotia, with their instructor Lt. H. D. Buchanan, R.C.N., prior to take-off in the Grumman Avenger seen in the background. *(See "Naval Air Training in Canada," on this page.)*

Inter-services Toboganning

THE inter-services toboganning event on the Cresta Run, St. Moritz, Switzerland, was won by the Royal Air Force. The combined times for three runs were: F/O. C. Mitchell, 143.2 sec; Major R. Dixon, 144.2 sec and Lt. W. H. Wenworth 144.7 sec.

Reunion

THE 31st all-rank reunion of No. 269 Squadron and R.N. Seaplane Bases Port Said and Alexandria will be held at Stewart's Restaurant, Old Bond Street, London, W.1, on April 25th at 6 p.m. Tickets are 13s 6d each, from W. C. Shilling, "Selgrove," Kewferry Drive, Northwood, Middlesex.

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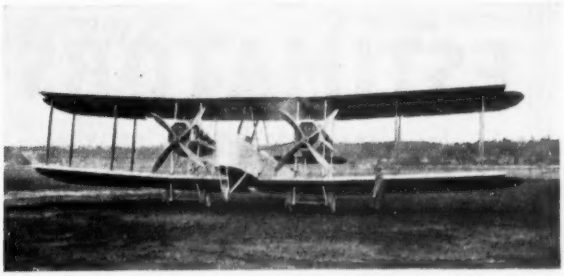
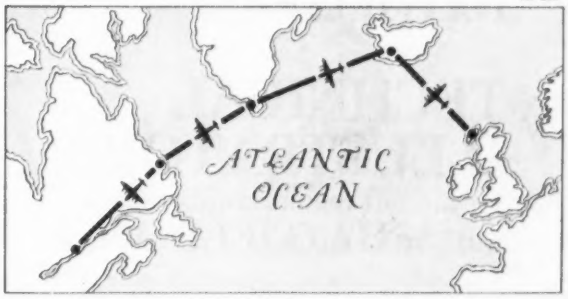
Many will recall the night of June 14th, 1919, when John Alcock and Arthur Whitten Brown made



the first direct Atlantic flight—in the reverse direction—in a Vickers Vimy biplane, powered, like the Viscount, by Rolls-Royce engines.



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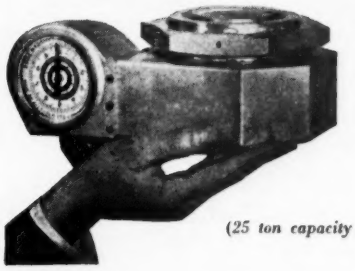

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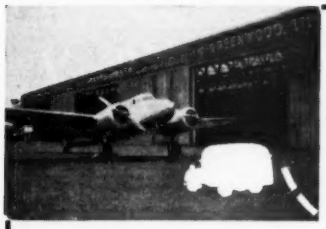

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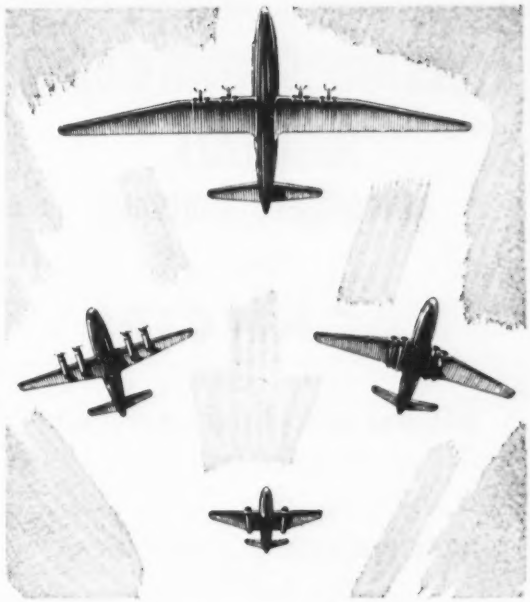

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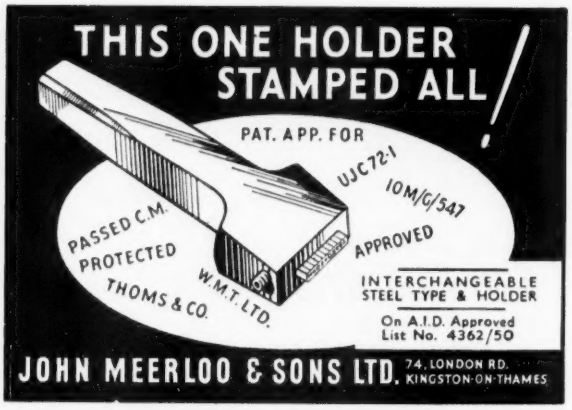

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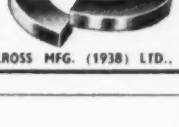

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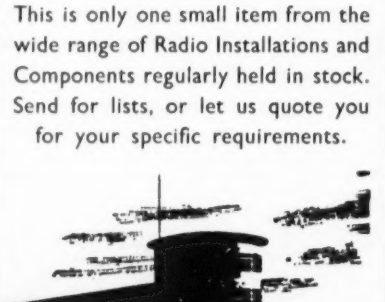

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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM Eagle Aviation, Ltd., of 29, Clarges Street, London, W.1:—

Application No. 158 for a normal scheduled seasonal service initially with Dakota aircraft for the carriage of passengers, supplementary freight and mail between London (Blackbushe) and Cannes, at a frequency of three services weekly during the period from May 1st, 1953, to September 30th, 1962.

Application No. 159 for a normal scheduled service initially with Dakota aircraft for the carriage of passengers, supplementary freight and mail between London (Blackbushe) and Helsinki, with intermediate traffic stops at Sylt, Aalborg and Gothenburg, at a frequency of from one to two services weekly during the period from August 1st, 1953, to July 31st, 1963.

Application No. 160 for an all-freight service initially with Dakota aircraft for the carriage of freight on the route London (Blackbushe), Birmingham, Amsterdam, Copenhagen, Stavanger, Oslo, Stockholm, Gothenburg, Copenhagen, Amsterdam, Birmingham, London, at a frequency of from one to three services weekly during the period from April 1st, 1953, to March 31st, 1963.

Application No. 161 for an all-freight service initially with Dakota aircraft for the carriage of freight between London (Blackbushe) and Munich (Riem) with intermediate traffic stops at Cologne and Frankfurt, at a frequency of from one to three services weekly during the period from May 1st, 1953, to April 30th, 1963.

Application No. 162 for an all-freight service initially with Dakota aircraft for the carriage of freight between London (Blackbushe) and Guernsey/Jersey, C.I., at a frequency of from one to three services weekly during the period from April 1st, 1953, to March 31st, 1963.

Application No. 163 for an all-freight service initially with Dakota aircraft for the carriage of freight between London (Blackbushe) and Milan (Malpensa) with intermediate traffic stops at Lyons and Marseilles, at a frequency of from one to two services weekly during the period from April 1st, 1953, to March 31st, 1963.

Application No. 164 for a normal scheduled seasonal service initially with Dakota aircraft for the carriage of passengers, supplementary freight and mail between London (Blackbushe) and Pau, at a frequency of two services weekly during the period from April 1st, 1953, to October 1st, 1962.

Application No. 165 from British European Airways Corporation, of Keyline House, Ruislip, Middlesex, for a normal scheduled seasonal service with D.C.3, Pionair, Viking, Viscount and Airspeed Ambassador aircraft for the carriage of passengers, supplementary freight and mail between London (Northolt) and Biarritz (Bavonne) with an intermediate stop at Bordeaux (for traffic to and from the United Kingdom only), at a frequency of from three to seven services weekly during the period from April, 1953, to September, 1962.

THESE applications will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9, Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [9283

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INDEX TO ADVERTISERS

	Page
Aerocontacts, Ltd.	32
Aircraft Materials, Ltd.	4
Alvis, Ltd.	19
Amal, Ltd.	31
Armstrong Whitworth Aircraft, Ltd., Sir W. G.	11, 28, 30
Aviation Traders, Ltd.	16
B.B. Chemical Co., Ltd.	16
Blackburn and General Aircraft, Ltd.	2, 33
Bristol Aeroplane Co., Ltd., The	34, Cover iv
British Aviation Insurance Co., Ltd., The	8
British Ermeto Corporation, Ltd.	14
British Messier, Ltd.	25
British Overseas Airways Corporation	22, 23
British Thomson-Houston Co., Ltd., The	29
Brown (Tractors), Ltd., David	24
Burnley Aircraft Products, Ltd.	6
Canadair, Ltd.	21
Cross Manufacturing (1938), Ltd.	31
De Havilland Aircraft Co., Ltd., The	17, 28
Dowty Equipment, Ltd.	34
E.M.I. Institutes	36
Esso Petroleum Co., Ltd.	26
Fairey Aviation Co., Ltd., The	10
Feltham and Son, Ltd., Walter H.	36
Firth-Vickers Stainless Steels, Ltd.	5
Fletcher's Bookshop, Alick	36
Fox and Sons (Aviation), Ltd., C. J.	31
Gloster Aircraft Co., Ltd.	18
Greenwood (Willesden), Ltd., P. W.	29
Handley Page (Reading), Ltd.	34
Hellerman, Ltd.	14
Hobson, Ltd., H. M.	3, 34
Hymatic Engineering Co., Ltd., The	20
Kelvin and Hughes (Aviation), Ltd.	Cover ii
Kenton Equipment, Ltd.	29
Lewis, Ltd., D.	31
Marshalls Flying Services, Ltd.	36
Meerloo and Sons, Ltd., John	30
Muir and Adie, Ltd.	36
National Institute of Engineering	35
Normalair, Ltd.	15
Opperman, Ltd., S. E.	30
Percival Aircraft Ltd.	35
Robinson and Co. (Gillingham), Ltd.	8
Roe and Co., Ltd., A. V.	13
Rolls-Royce, Ltd.	36
Rotax, Ltd.	Cover i
Sangamo Weston, Ltd.	24
Shackleton, Ltd., W. S.	33
Simmonds Aerocessories, Ltd.	7
Staravia	36
Teddington Controls, Ltd.	6
T.I. Aluminium, Ltd.	Cover iii
Uhlhorn Brothers, Ltd.	30
Vaughan and Co., Ltd., Edgar	1
Vokes, Ltd	4
Vickers-Armstrongs, Ltd.	12, 27, 28
Western Manufacturing (Reading), Ltd.	8
Westland Aircraft, Ltd.	9
Wolverhampton Aviation, Ltd.	31

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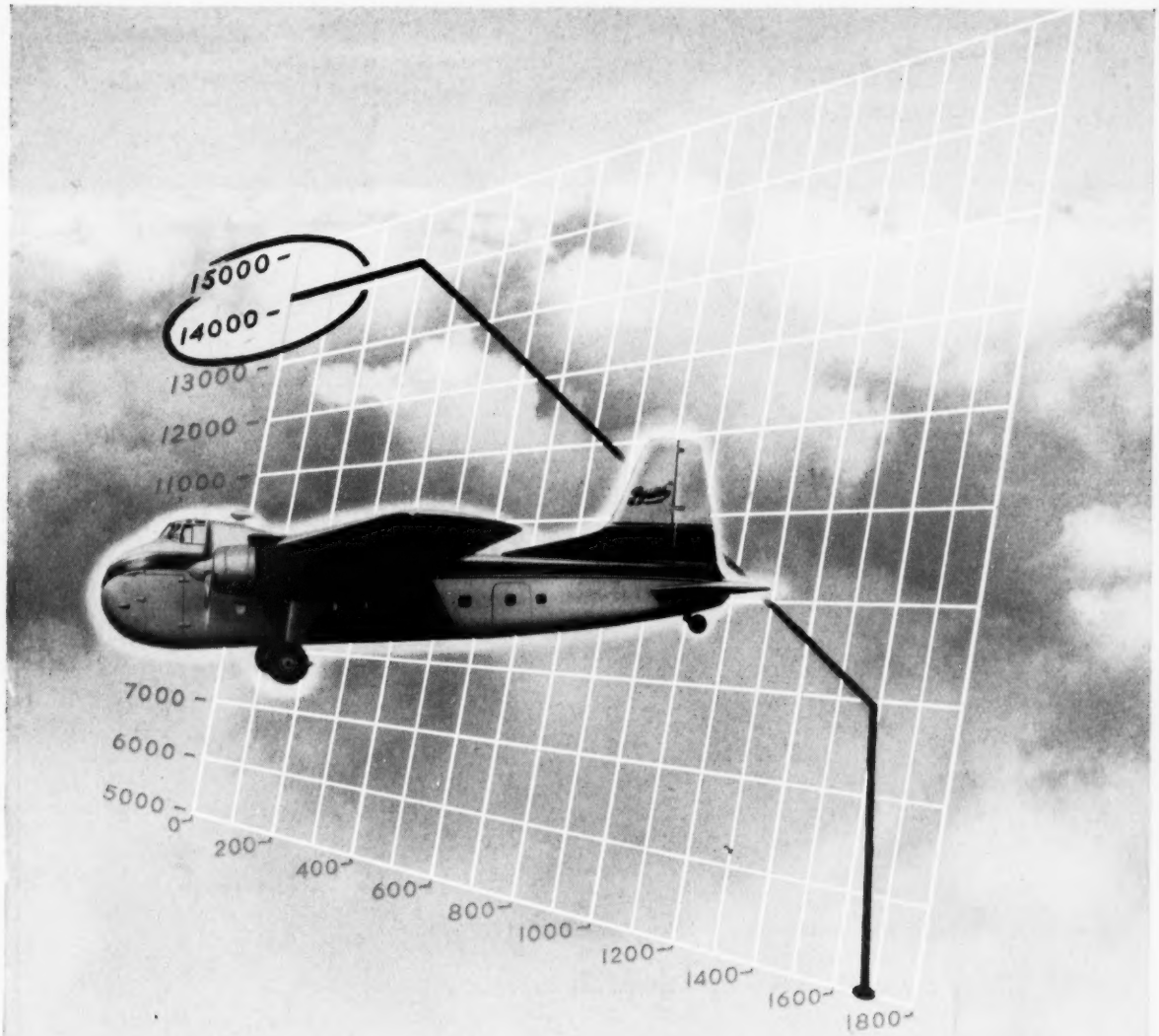

An increase in payload capacity of nearly 2,000 lb is now available to operators of the Mk.31 version of the Type 170 Freighter. This is the result of the aircraft being officially cleared for operation at the advanced a.u.w. of 44,000 lb. Beyond the use of new type wheels and tyres no structural payment is exacted in return, and the advantage is realisable over all stage lengths between 250 and 1,600 miles. (I.S.A.C.)

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